

Strategy:
**Managing Non-Forested Upland Plant Communities to Obtain Desired
Conditions for Rangeland Health and to Sustain Multiple Uses**
Salmon-Challis National Forest



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April 2008

Introduction

There are many non-forested upland plant communities occupying lands across the Salmon-Challis National Forest, some being more common in some Ranger Districts than others. There is considerable variability within these plant communities from one District to another due to several physical factors such as parent material, precipitation amounts and patterns, and the complexity of geomorphic landforms. In addition, there is also considerable variability within a particular community due to soil characteristics (texture, depth), slope, elevation, effective precipitation, and aspect.

This Upland Strategy (“Strategy”) provides a platform to identify non-forested upland plant communities and identify desired conditions (objectives) applicable to the various non-forested communities on the Salmon-Challis National Forest. The Strategy is not intended to modify the stated desired conditions or objectives in existing Allotment Management Plans nor to modify or negate existing long term trend monitoring, analyses, or interpretations. It is expected that the indicators displayed in the Strategy will be modified and refined to reflect the particular characteristics at both the District level and at the more refined project level.

The Strategy focuses on the sagebrush (*Artemisia*)/grassland communities since these communities make up the vast majority of the non-forested uplands on the Forest. However, the Strategy also includes the tall shrub communities of mountain mahogany and mixed mountain shrub in addition to the mixed perennial grassland communities. Aspen communities associated with the uplands are also included in a separate section.

Adoption of the concepts of this Strategy will result in a consistent approach to identifying and addressing the purpose and need spearheading the livestock grazing permit renewal environmental analyses. Other potential direct and indirect benefits of the adoption of this Strategy include:

- Simplifying and reducing workloads associated with rangeland administration;
- Simplifying and standardizing monitoring and reporting efforts;
- Simplifying and reducing workloads associated with NEPA;
- Providing for more efficient responses to FOIAs, NOIs, and litigation.

This Strategy mirrors the direction presented in 36CFR 219.20 that emphasizes ecological sustainability through the evaluation and status of ecosystem diversity and species diversity. The application of the ecological sustainability concept has been further simplified in Region 4 through FSH 2209.21 R4 Amendment 2209-21-2003 as “rangeland health.”

Non-Forested Upland Goals

A simplified goal for the non-forested uplands is to obtain and maintain healthy rangelands. Rangeland health is the state of vegetation and soil cover in relation to a standard or ideal for a particular rangeland type (FSH 2209.21.20.05). Rangeland health

is described as functioning, functioning-at-risk, or not functioning. Rangelands are functioning when they are meeting a desired condition identified in long-term specified management objectives, standards, and/or guidelines; and have the capability across the landscape for renewal, for recovery from a wide range of disturbances, and for retention of ecological resilience (FSH 2209.21.22).

Upland Rangeland Health Criteria

There is a minimum of four criteria to be considered when determining the health and function of upland rangelands. These four criteria were evaluated in RMRS-GTR-104 “Indicators of Rangeland Health and Functionality in the Intermountain West” (O’Brien et al. 2003) through a landscape level systematic sample scheme. These four criteria include non-native invasive plant species, ground cover, shrub cover, and species composition as described in FSH 2209.21.22.1.

Non-native invasive plant species: If non-native invasive plants or noxious weeds are present, the rangeland is functional-at-risk at best due to the aggressive nature of these species in both pristine and disturbed landscapes. The Strategy suggests that the mere presence of a noxious weed should not automatically influence the functionality determination for a site. Other factors need to be considered such as species of weed, size and distribution of infestation, and location of infestation.

Ground cover: If ground cover is greater than a described threshold to prevent adverse soil impacts, the rangeland is functioning from a watershed sustainability standpoint. Ground cover is defined as basal vegetation, litter, moss/lichen, or rock greater than $\frac{3}{4}$ ” diameter. RMRS-GTR-104 (O’Brien et al. 2003) and the Properly Functioning Condition Rapid Assessment Process (RAP) (USDA Forest Service 1997) provide ground cover values for generalized “cover types” which are too general and are not specific at the plant community level. The FSH 2209.21.22.1 shows ground cover values for slightly more refined “cover types” at somewhat reduced values. The Strategy suggests identifying representative ground cover values for the common plant communities present on the Forest as modified to represent site specific characteristics.

Shrub cover: This rangeland health indicator is a landscape level indicator, rather than a site specific indicator. Both the FSH and the RAP describe the desired cover and distribution for a ‘generic’ mountain big sagebrush cover type. Since it is recognized that this criteria is a landscape level indicator, the amount and distribution of sagebrush identified on a particular site may or may not be within the stated ranges. The results of several sample locations need to be assessed as a whole across the pasture or allotment (or beyond) in order to determine if the landscape has a reasonable or desired mix and distribution of sagebrush cover. There are many species and sub-species of ‘big’ and ‘little’ sagebrush occupying the rangelands and all have a tendency to increase in cover or density due to a wide variety of influences, both human caused and natural occurrences, such as drought and lack of fire episodes. The distribution of sagebrush cover across a landscape can be viewed as a bell-shaped curve. The two tails of the curve represent a relatively small percent of the landscape that have very sparse sagebrush cover and very

dense sagebrush cover. The broader area of the curve represents the majority of the landscape that has a wide range of very diverse sagebrush cover. Managing livestock to obtain or trend towards a desirable sagebrush cover distribution is not appropriate. Other management actions (i.e. vegetation treatments) would have to be evaluated in order to effectively meet this criterion at the landscape level. The Strategy expands on the plant community descriptions to include a reasonable range of sagebrush cover and distribution at the landscape level appropriate for the particular plant community.

Species composition: FSH 2209.21.22.1 states that determining if the proper vegetation is present on a site is the most difficult question in ascertaining rangeland health. A general evaluation may be conducted using a basic species composition list; however, species lists may need to be revised to adequately assess a site's ability to meet more specific health or other management objectives. There are no specific desired compositions stated in the FSH, RMRS-GTR-104, or the Rapid Assessment Process references. Any quantitative desired condition must be developed based on data obtained from site-specific plant communities. A rangeland site is functioning when all the desired plants are present in the desired amount. The interpretation of desired species and amount may change when objectives change as needed for specific purposes or resource values.

Total grass cover (canopy and basal) will be the primary basis in deriving the desired condition for this rangeland health indicator. Herbaceous annual production and cover is highly dependent on seasonal variations and site characteristics. Generally, all native grass species within the Forest are desirable native perennial grasses (commonly referred to as 'decreasers' under livestock grazing). Occasionally, sites are encountered where a native, undesirable grass has either encroached onto a site ('out of place') or has increased in cover ('increaser') outside its expected range of variability. In these cases the species distribution is included in assessing desired condition.

Forb cover is also recognized as an important component of the plant community. However, since forb presence or absence is highly variable from year to year, specific desired conditions can not be developed beyond that which is stated in general terms in the plant community site description table. Where resource values and uses may be dependent upon forbs, specific desired conditions should be developed to meet those needs.

Non-Forested Upland Desired Conditions (objectives)

The desired conditions, or objectives, are described in measurable quantified terms focusing on percent cover and the percent of bare ground. Primary indicators include landscape scale shrub cover and site specific total grass cover and bare ground. Bare ground is the portion of the soil surface that is not covered by organic ground cover or rock and includes exposed soil and rock smaller than $\frac{3}{4}$ inch. Objectives are described for each plant community, again with the understanding that site specific refinement or validation is expected.

Obtaining or Updating Current Conditions

The percent ground cover and percent species cover can be measured through a variety of techniques. For ground cover the currently accepted and most widely used method for long term trend monitoring on the Forest is using the four points within the nested frequency frame as cover sample points while reading the nested frequency plots. Ground cover and herbaceous basal cover can be obtained from this method. Percent total cover (canopy and basal) by species can not be obtained by nested frequency plots as this method only indicates the frequency of occurrence, not cover. Although there are numerous nested frequency plots permanently established across the Forest, most have not been maintained on their long term monitoring schedule.

There are two upland rangeland inventory methods currently employed on the Forest. The “Lost River” inventory method incorporates the use of line intercept and sample plots to obtain shrub cover, herbaceous species canopy cover, and ground cover data along with life form and species structural data. It is very detailed and data ‘rich’ but also very time consuming. The “North Zone” method is a newly developed rapid assessment process utilizing a point step transect. The method is a modification of the Step Point Method described in the Interagency Technical Reference 1734-4 (USDI BLM 1996). Species canopy, basal cover, and ground cover are obtained from 200 sample points by pacing along a permanently marked transect. The sample method is rapid which allows more site locations to be sampled. The Lost River protocol is attached as Appendix 2 and the North Zone protocol is attached as Appendix 3. Both inventory methods can utilize the old range analysis green sheet mapping polygons to provide a relatively easy subjective sample scheme. The old range analysis polygons have also been digitized into GIS for spatial analysis. All the necessary information to evaluate the four indicators of rangeland health and function can be obtained from either one of these procedures. Weed presence information can be further supported by ongoing weed inventory and GIS maps if necessary.

Rangeland Health and Function Evaluation

Using the data obtained from either of the inventory protocols, it is a relatively simple task to evaluate the data in regards to meeting the desired conditions for the plant community. The percent bare ground and grass cover composition have specific desired condition values to be considered healthy and functional. If either is outside this range the site would be considered “at risk.” Weed presence and sagebrush cover and distribution may also influence this determination. Those locations considered not meeting the desired conditions and hence rated “at risk” would be evaluated for establishing long term effectiveness monitoring. A step-by-step strategy to interpret this data is presented below. An example of a rangeland health and function evaluation using data from the 2004 North Zone protocol is presented in Appendix 4 for the Agency Creek Allotment.

A Strategy to Interpret and Assess Rangeland Health Inventory Data

After making the appropriate calculations from the inventory data, and considering other resource needs or values, is the upland site meeting the Desired Conditions?

Yes - proceed to **Protocol for Upland Sites Meeting Desired Conditions** (see below)

No - **Protocol for Upland Sites Not Meeting Desired Conditions**

Question 1

Does the inventory site location adequately represent the vegetation conditions of the sampled upland community type and/or the management unit?

Yes - go to next question

No - investigate and assess other site locations within the management unit that will represent the appropriate upland community type and/or management unit

Question 2

Are domestic livestock a significant factor in not meeting the desired conditions?

Yes - go to Step 1

No - fully document the process and rationale for this determination. Continue with current livestock management. Go to Step 4.

Step 1

- Evaluate current livestock management to identify any contributing factors that may have lead to the current conditions including aspects such as utilization levels, season of use, duration of use, intensity of use, kind and class of livestock, etc.
- Initiate adaptive management that is anticipated to obtain or trend towards meeting the desired conditions.
- Establish an effectiveness monitoring permanent plot at the inventory site within 3-5 years to obtain baseline data and to serve as the long-term monitoring location to assess trend towards meeting the appropriate desired conditions.

Step 2

- Begin annual implementation monitoring at the established monitoring site location based on management factor(s) determined in Step 1.

Step 3

- Re-read the permanent effectiveness monitoring plot on a 10-year cycle from the year the site was established. Assess and evaluate the effectiveness monitoring data to answer the following question:

Is the site meeting or trending towards the desired conditions?

Yes - proceed to **Protocol for Upland Sites Meeting Desired Conditions** if the site is meeting the desired condition; continue effectiveness monitoring if the site is trending towards the desired conditions.

No - Evaluate all factors that may be contributing to this finding and reinitiate adaptive management using Steps 1 and 2 of the **Protocol for Upland Sites Not Meeting Desired Conditions** above.

Protocol for Upland Sites Meeting Desired Conditions

Step 4

- Maintain (at a minimum) a photo point at selected inventory site locations considered representative of livestock management within the management unit.
- Retake photo points every 5-10 years
- Proceed to **Step 5** if photo monitoring indicates a change of conditions or if changes in management needs arise (such as utilization checks indicate grazing use is not meeting prescription, fire events, drought impacts on uplands, etc.).

Step 5

- Repeat inventory procedure to answer the question:

Is the upland site meeting Desired Conditions?

Yes - go to **Step 4**

No - initiate the **Protocol for Upland Sites Not Meeting Desired Conditions** by answering Questions 1 and 2 above.

Implementation Monitoring; Non-Forested Upland Livestock Grazing Use Indicator Values

Livestock grazing would be managed to achieve the desired condition for the upland plant communities within a defined grazing unit (i.e. pasture) or allotment. The Strategy does not display or dictate specific annual grazing use indicator values. The appropriate grazing use indicators and indicator values need to be identified and tailored for the individual grazing unit and/or allotment. Adaptive management provides for the opportunity to manipulate grazing intensity, duration, and timing in order to meet long-term desired conditions and other specified resource objectives. Depending on the application and flexibility of these grazing administration options, a wide range of annual indicator values may be identified and appropriately applied.

There is a wide variety of annual forage use monitoring protocols available to the Forest. FSH 2209.21.31 R4 Amendment 2209.21-2003-1 references the Interagency Technical Reference "Utilization Studies and Residual Measurements" 1734-3 which includes several accepted methods of measuring annual forage use for both the herbaceous and shrub life-forms.

Effectiveness Monitoring

The determination of what level of long-term effectiveness monitoring may be necessary will be made at the District level. One “at risk” site within a pasture or an allotment may not warrant the establishment of long-term effectiveness monitoring. Additional site investigation and evaluation should be made to determine site potential, size of the area, whether the site in question is representative of the management area, whether livestock are contributing to the situation, and if changes in management will affect a change in conditions.

Neither of the current upland inventory protocols is an effectiveness monitoring method. Both inventory methods require additional site modification to establish long-term monitoring. The accepted long-term trend monitoring protocols on the Forest include nested frequency and line intercept (FSH 2209.21 Ch. 40); however, neither of these methods provides herbaceous species canopy cover. The Strategy recommends that if long-term effectiveness monitoring is warranted on a particular upland site to monitor the trend towards meeting the desired conditions and rangeland health and function that the protocols developed on the Dixie and Fishlake NF (USDA Forest Service 2002) be used. This monitoring design has recently been accepted by the Region. The first step would be to establish a benchmark monitoring location at the inventoried site or at a location that is representative of the area “at risk” to obtain baseline data. This permanent long-term effectiveness monitoring ‘benchmark’ would be re-read on an established schedule every 5 to 10 years. The Dixie/Fishlake protocol is a relatively rapid process that incorporates a modified nested frequency and circular plot design to monitor long-term change in ground cover and species composition by canopy and basal cover. If shrub cover is a concern, a line intercept design can be established at the same site. It is further recommended that an additional benchmark effectiveness monitoring site be established on a functioning site of the same plant community within the allotment to act as a control to aid in interpreting trend. In addition, the two inventory protocols record and mark permanent locations with photographic records that can be revisited and re-photographed in later years as additional tools for long-term evaluation and analysis.

Compliance with Forest Plans

This Strategy is in compliance with both the Challis and Salmon National Forest Land and Resource Management Plans, dated 1987 and 1988, respectively. The Strategy provides guidelines that refine, quantify, and complement the general goal and objective statements found in Section IV of the plans. Generally speaking, the plans intend to maintain suitable rangelands that are in satisfactory condition and improve those rangelands that are not in satisfactory condition. The two inventory protocols provide quantitative data that relates directly to evaluating rangeland health, function, and condition.

The Salmon National Forest finalized a plan amendment entitled “Establishing Grazing Monitoring Procedures” in April 1992. This amendment established monitoring and utilization levels tied to goals and objectives (formulated in Allotment Management Plans

at the site specific level) and developed criteria for establishing key monitoring areas. Upland grazing use standards in the form of percent utilization and stubble height were developed based on the type of grazing system and site conditions. Since the Strategy is not suggesting or dictating specific grazing indicator use values, it is not modifying those procedures and therefore is in compliance with the 1992 plan amendment.

Non-Forested Upland Plant Communities

The non-forested upland plant communities most commonly observed on the Forest are described in the following pages in table format. The plant community site characteristics describe both the physical and biotic characteristics to assist in site identification in the field. As an aid in site identification, the table is organized by the generalized shrub height categories. Objectives describe the desired conditions in terms of percent canopy and basal cover for grasses. The ground cover indicator is shown as a percent allowable bare ground. The sagebrush cover and distribution is included in the site characteristics description and not displayed as a specific objective since this indicator should be evaluated across the landscape, possibly encompassing several plant communities. Numerous references were utilized to describe the upland plant communities shown on the following table (Hironaka et al. 1983, Mueggler et al. 1980, NatureServe 2002, NRSC, Oregon State University 1991, Society for Range Management 1994, Welch et al. 2003, USDA Forest Service 1997, USDA Forest Service 1999) in addition to local field data and input from Forest Range Management Specialists. Both the grass cover and the bare ground values were refined from reviewing the data gathered during the 2003-2004 Lost River inventory and the 2004 North Zone inventory covering portions of the Leadore, Salmon/Cobalt, North Fork, and Challis Ranger Districts. This data represents a cross section of the more common rangeland plant communities on the Forest. Refinements and validation for local site characteristics and site potential is expected, and is especially important when evaluating the low sage (ARAR8), mixed perennial grassland, dry semi-wet meadow, mountain mahogany, and mountain shrub communities as very few of these sites have been sampled. In addition, refining the desired conditions and site objectives to support other resource values and uses should be considered.

Plant Community Description	Desired Conditions (Objectives)	
I. Low Shrub Communities (shrub height less than 12 inches)	Grass Cover Canopy (Basal)	Bare Ground Cover
<p>A. Low Sagebrush/Bluebunch wheatgrass (ARAR8/AGSP); <i>Artemisia arbuscula/Agropyron spicatum</i> Elevation 5200-7500 feet; precipitation 10-16 inches. Typically occurs on alluvial and colluvial fans, terraces, and gentle foothills, usually less than 35% slope but can range to over 70%. The two phases are moisture and aspect dependent.</p> <p><u>Soil characteristics:</u> The soils are commonly dry and rocky, with large amounts of bare soil and surface rock. Shallow¹ to moderately deep² cobbly³ to extremely gravelly⁴ loams, clay loams, and clays. Often with restrictive clay horizon or indurated hardpan at less than 20 inches.</p> <p><u>Vegetation:</u> Dry Phase: 15-30 percent total vegetation comprised of 10-20% shrub, 30-40% grasses, and 5-15% forbs. Moist Phase: 25-55 percent total vegetation comprised of 15-25% shrub, 30-45% grasses, and 10-20% forbs. Vegetation diversity is relatively high with approximately 25 species of perennial grasses, forbs, and shrubs. <i>Artemisia arbuscula</i> alone or in combination with <i>Artemisia tridentata</i> create the shrubby aspect in this shrubland community. <i>Agropyron spicatum</i> is the dominant herbaceous species with prairie junegrass (<i>Koeleria cristata</i>) and Sandberg's bluegrass (<i>Poa secunda</i> also being common grasses. Although a variety of forbs may occur, only Hood's phlox (<i>Phlox hoodii</i>) is consistently present.</p> <p><u>Sagebrush distribution:</u> 20 percent of the landscape has 5 to 10 percent shrub canopy cover; 60 percent with 10 to 20 percent shrub canopy cover; and 20 percent greater than 20 percent shrub canopy cover.</p> <p><u>Ground Cover:</u> Dry Phase surface rock and litter cover 20-50%, bare ground 20-30%; moist phase surface rock and litter cover 20-30%, bare ground 15-25%. May provide winter habitat for big game and summer habitat and lek sites for sage grouse. Fire interval is infrequent (80-100 years).</p>	<p>Dry Phase: ≥10% (≥2%) Moist Phase: ≥12% (≥3%)</p>	<p>Dry Phase: ≤30% Moist Phase: ≤25%</p>

1 Shallow; 10-20 inches deep

2 Moderately deep; 20-40 inches deep

3 Cobbly; cobbles 3-10 inches in size

4 Extremely gravelly; >60% gravels <3inches in size

Plant Community Description	Desired Conditions (Objectives)	
I. Low Shrub Communities (shrub height less than 12 inches)	Grass Cover Canopy (Basal)	Bare Ground Cover
<p>B. Low Sagebrush/Idaho fescue (ARAR8/FEID); <i>Artemisia arbuscula/Festuca idahoensis</i> Elevation 6500-8500 feet; precipitation 13-16 inches. Typically occurs on alluvial and colluvial fans, terraces, and gentle foothills, usually less than 35% slope but can range to over 50%.</p> <p><u>Soil characteristics:</u> Shallow¹ to moderately deep² cobbly³ to extremely gravelly⁴ loams, clay loams, and clays. Often with restrictive clay horizon between 3 and 10”.</p> <p><u>Vegetation:</u> 30-60 percent total vegetation cover comprised of 15-30% shrub, 20-50% grasses, and 10-20% forbs. Vegetation diversity is relatively high with approximately 35 species of perennial grasses, forbs, and shrubs. The ARAR8/FEID community differs vegetatively from the ARAR8/AGSP community by the conspicuous amounts of Idaho fescue and the relative abundance of forbs. The predominant graminoids are Idaho fescue, bluebunch wheatgrass, and prairie junegrass. Common forbs include pussytoes (<i>Antennaria</i>), Hood’s phlox, and daisies (<i>Erigeron</i>).</p> <p><u>Sagebrush distribution:</u> 20 percent of the landscape has 5 to 10 percent shrub canopy cover; 60 percent with 10 to 20 percent shrub canopy cover; and 20 percent greater than 20 percent shrub canopy cover.</p> <p><u>Ground Cover:</u> Surface rock and litter cover 20-50%, bare ground 10-30%.</p> <p>May provide summer sage grouse habitat and winter big game habitat. Fire interval is infrequent (80-100 years).</p>	≥15% (≥3%)	≤30%

1 Shallow; 10-20 inches deep

2 Moderately deep; 20-40 inches deep

3 Cobbly; cobbles 3-10 inches in size

4 Extremely gravelly; >60% gravels <3inches in size

Plant Community Description	Desired Conditions (Objectives)	
II. Medium Shrub Communities (mature shrub height between 12 and 38 inches)	Grass Cover Canopy (Basal)	Bare Ground Cover
<p>A. Wyoming big sagebrush/bluebunch wheatgrass (ARTRW/AGSP); <i>Artemisia tridentata ssp. wyomingensis/Agropyron spicatum</i> Elevation 5000-7000 feet; precipitation 8-11 inches. Typically occurs on gently¹ to moderately sloping² rolling hills, fans, and terraces with slopes generally less than 35%. <u>Soil Characteristics:</u> Deep³ silt loams, gravelly⁴ silt loams, medium textured, often with a lime accumulation 8-12 inches deep. <u>Vegetation:</u> 25-60 percent cover, greater than 75% on extremely moist sites. Life form cover ranges are 10-25 percent shrubs, 30-40 percent grasses, 5-10 percent forbs. Vegetation diversity is relatively high with approximately 20 species of perennial grasses, forbs, and shrubs. The obvious dominant shrub in this community is Wyoming big sagebrush although three-tip sagebrush (<i>A. tripartita</i>) may also be present at higher elevations or on northern exposures. The herbaceous understory is dominated by bluebunch wheatgrass. Other common grasses include prairie junegrass (<i>Koeleria cristata</i>), Sandburg bluegrass (<i>Poa secunda</i>), squirreltail (<i>Sitanion hystrix</i>), and needlegrasses (<i>Stipa spp.</i>). Though a variety of forbs may be present they are generally not abundant. No single forb species occurs consistently. <u>Sagebrush Distribution:</u> 15 percent of the landscape has 5 to 15 percent shrub canopy cover; 60 percent with 15 to 25 percent shrub canopy cover; and 25 percent greater than 25 percent shrub canopy cover. <u>Ground Cover:</u> Surface rock and litter cover 25-50%, bare ground 15-30%. This plant community may provide deer and elk winter range and sage grouse nesting and summer brood rearing habitat in addition to winter habitat. Fire interval is infrequent (35-100 years)</p>	≥15% (≥3%)	≤30%

- 1 Gently sloping; 1-8% slopes
- 2 Moderately sloping; 4-16% slopes
- 3 Deep; 40-60 inches deep
- 4 Gravelly; 15-35% gravels <3 inches in size

Plant Community Description	Desired Conditions (Objectives)	
II. Medium Shrub Communities (mature shrub height between 12 and 38 inches)	Grass Cover Canopy (Basal)	Bare Ground Cover
<p>B. Three-tip sagebrush/bluebunch wheatgrass-Idaho fescue (ARTR4/AGSP-FEID); <i>Artemisia tripartita/Agropyron spicatum-Festuca idahoensis</i></p> <p>Elevation 5600-9000 feet; precipitation 12-16 inches.</p> <p>Typically occurs on gently¹ to moderately sloping² rolling hills, mountain slopes, and ridges with slopes ranging from 2 to 70%.</p> <p><u>Soil characteristics:</u> Moderately deep³ to deep⁴ loams and clay loams to extremely gravelly⁵ loams.</p> <p><u>Vegetation:</u> Total vegetation cover is 30-70 percent. Life form cover ranges are 10-25 percent shrubs, 30-60 percent grasses, 5-10 percent forbs. Vegetation diversity is relatively high with approximately 25 species of perennial grasses, forbs, and shrubs. The obvious dominant shrub is three-tip sagebrush although mountain big sagebrush (<i>Artemisia tridentata var. vaseyana</i>) can occur on northern aspects and Wyoming big sagebrush (<i>Artemisia tridentata var. wyomingensis</i>) can occur on lower elevations. Three-tip sagebrush is a weak to moderately strong sprouter after fire disturbance. Idaho fescue and bluebunch wheatgrass occur together on this site; fescue being dominant on moister and northern aspect sites while bluebunch being dominant on drier and southern aspect sites. Other common grasses include prairie junegrass (<i>Koeleria cristata</i>) and needlegrasses (<i>Stipa spp.</i>). Though a variety of forbs may be present they are generally not abundant. No single forb species occurs consistently.</p> <p><u>Sagebrush distribution:</u> 15 percent of the landscape has 5 to 15 percent shrub canopy cover; 60 percent with 15 to 25 percent shrub canopy cover; and 25 percent greater than 25 percent shrub canopy cover.</p> <p><u>Ground cover:</u> Surface rock and litter 25-40%; bare ground 15-20%.</p> <p>This plant community may provide deer and elk winter range and summer brood rearing habitat for sage grouse. Fire frequency is infrequent (35-100 years).</p>	≥20% (≥4%)	≤20%

1 Gently sloping; 1-8% slopes

2 Moderately sloping; 4-16% slopes

3 Moderately deep; 20-40 inches deep

4 Deep; 40-60 inches deep

5 Extremely gravelly; >60% gravels <3inches in size

Plant Community Description	Desired Conditions (Objectives)	
II. Medium Shrub Communities (mature shrub height between 12 and 38 inches)	Grass Cover Canopy (Basal)	Bare Ground Cover
<p>C. Mountain big sagebrush/bluebunch wheatgrass (ARTRV/AGSP); <i>Artemisia tridentata ssp. vaseyana/Agropyron spicatum</i></p> <p>Elevation 4800-8000 feet; precipitation 12-18 inches.</p> <p>Typically occurs on gently¹ to moderately sloping² rolling hills and mountain slopes with slopes ranging from 10 to 40%.</p> <p><u>Soil characteristics:</u> Moderately deep³ to deep⁴ loams and clay loams to very gravelly⁵ and stony⁶ loams. A heavy clay layer is common at 20 inches.</p> <p><u>Vegetation:</u> Total cover ranges from 25-60 percent. Life form cover ranges are 10-25 percent shrubs, 30-60 percent grasses, 5-15 percent forbs. Vegetation diversity is relatively high with approximately 20 species of perennial grasses, forbs, and shrubs. The obvious dominant shrub is mountain big sagebrush although Wyoming big sagebrush and three-tip sagebrush may be present on drier sites. Bluebunch wheatgrass is the dominant grass on this site although Idaho fescue is often common. Other common grasses include prairie junegrass (<i>Koeleria cristata</i>), Sandberg's bluegrass (<i>Poa secunda</i>), elk sedge (<i>Carex geyeri</i>), and needlegrasses (<i>Stipa spp.</i>). Though a variety of forbs may be present they are generally not abundant. No single forb species occurs consistently.</p> <p><u>Sagebrush distribution:</u> 15 percent of the landscape has 5 to 15 percent shrub canopy cover; 60 percent with 15 to 25 percent shrub canopy cover; and 25 percent greater than 25 percent shrub canopy cover.</p> <p><u>Ground cover:</u> Surface rock and litter 25-40%; bare ground 10-20%.</p> <p>This plant community may provide deer and elk winter range and summer brood rearing habitat and winter habitat for sage grouse.</p> <p>Fire frequency is frequent (15-35 years).</p>	≥20% (≥3%)	≤20%

- 1 Gently sloping; 1-8% slopes
- 2 Moderately sloping; 4-16% slopes
- 3 Moderately deep; 20-40 inches deep
- 4 Deep; 40-60 inches deep
- 5 Very gravelly; 35-60% gravels ≤ inches in size
- 6 Stony; stones 10-24 inches in size

Plant Community Description	Desired Conditions (Objectives)	
II. Medium Shrub Communities (mature shrub height between 12 and 38 inches)	Grass Cover Canopy (Basal)	Bare Ground Cover
<p>D. Mountain big sagebrush/Idaho fescue (ARTRV/FEID); <i>Artemisia tridentata ssp. vaseyana/Festuca idahoensis</i> Elevation 5800-8500 feet; precipitation 13-22 inches. Typically occurs on gently¹ to moderately sloping² rolling hills and mountain slopes with slopes ranging from 10 to 60%.</p> <p><u>Soil characteristics:</u> Deep³ to very deep⁴ loams and clay loams to extremely gravelly⁵ and stony⁶ loams. A thick (5-15") surface 'A' horizon is common.</p> <p><u>Vegetation:</u> Total cover ranges between 35-70 percent. Life-form cover ranges are 10-25 percent shrubs, 30-60 percent grasses, 5-15 percent forbs. Vegetation diversity is relatively high with approximately 20 species of perennial grasses, forbs, and shrubs. The obvious dominant shrub is mountain big sagebrush although other mountain shrubs (bitterbrush, snowberry) may be present. Idaho fescue is the dominant grass although bluebunch wheatgrass is also present on drier sites. Other common grasses include prairie junegrass (<i>Koeleria cristata</i>), Nevada bluegrass (<i>Poa nevadensis</i>), elk sedge (<i>Carex geyeri</i>), and needlegrasses (<i>Stipa spp.</i>). A variety of forbs may be present and can be abundant. Lupine, phlox and <i>Antennaria</i> are consistently common forbs.</p> <p><u>Sagebrush distribution:</u> 10 percent of the landscape has 5 to 10 percent shrub canopy cover; 50 percent with 10 to 20 percent shrub canopy cover; and 40 percent greater than 20 percent shrub canopy cover.</p> <p><u>Ground cover:</u> Surface rock and litter 20-30%; bare ground 10-20%.</p> <p>This plant community may provide upper elevation elk winter range and elk and deer summer range if cover is available; may provide summer and winter habitat for sage grouse. Fire frequency is frequent (15-35 years).</p>	≥20% (≥4%)	≤20%

1 Gently sloping; 1-8% slopes

2 Moderately sloping; 4-16% slopes

3 Deep; 40-60 inches deep

4 Very deep; >60 inches deep

5 Extremely gravelly; >60% gravels <3inches in size

6 Stony; stones 10-24 inches in size

Plant Community Description	Desired Conditions (Objectives)	
III. Tall Shrub Communities (mature shrub height greater than 38 inches)	Grass Cover Canopy (Basal)	Bare Ground Cover
<p>A. Mountain mahogany/Bluebunch wheatgrass-Idaho fescue (CELE3/AGSP-FEID); <i>Cercocarpus ledifolius/Agropyron spicatum-Festuca idahoensis</i></p> <p>Two distinct sites are combined into one description referred to as dry phase and moist phase. Dry phase elevation 5500-7000 feet; precipitation 13-16 inches; moist phase 6500-8000 feet, 16-22 inches. Typically occurs on moderate¹ to steep² mountain slopes (10->60%) and ridges typically associated with limestone parent materials.</p> <p><u>Soil characteristics:</u> Moderate³ to deep⁴ loams and stony⁵ loams to extremely gravelly⁶ and stony loams. Very shallow⁷ soils and surface rock outcrops can be common.</p> <p><u>Vegetation:</u> Dry phase; total cover ranges between 25-50 percent. Life form cover ranges are 10-30 percent shrubs, 15-25 percent grasses, and 5 percent forbs. Moist phase; total cover ranges between 65-100 percent. Life form cover ranges are 40-75% shrubs, 15-20% grasses, and 5-10% forbs. The obvious dominant shrub is mountain mahogany. Other shrubs (sagebrush and rabbitbrush [<i>Chrysothamnus</i>] species) are common on the dry phase but generally absent on the moist phase due to the closed overstory provided by mahogany. Grasses on the dry phase include bluebunch wheatgrass along with needlegrasses and bluegrasses while the moist phase includes Idaho fescue, bluebunch wheatgrasses and prairie junegrass. Though a variety of forbs may be present they are generally not abundant.</p> <p><u>Shrub distribution:</u> Dry phase: 10 percent of the area has 5 to 10 percent shrub canopy cover; 60 percent of the area has 10 to 20 percent shrub canopy cover; 30 percent of the area has greater than 20 percent shrub canopy cover. Moist phase: 10 percent of the area has 5 to 20 percent shrub canopy cover; 20 percent of the area has 20 to 40 percent shrub canopy cover; 70 percent of the area has greater than 40 percent shrub canopy cover.</p> <p><u>Ground cover:</u> Surface rock and litter- Dry phase 25-40%; Moist phase 40-60%; bare ground- Dry phase 15-25%; Moist phase 10-15%.</p> <p>This plant community is a valued source of elk and deer winter forage and thermal cover; may provide summer habitat for sage grouse.</p> <p>Fire frequency is infrequent (35-100 years).</p>	<p>Dry phase: ≥10% (≥5%) Moist phase: ≥15% (≥7%)</p>	<p>Dry phase: ≤25% Moist phase: ≤15%</p>

1 Moderate (moderately steep); 10-30% slope

2 Steep; 20-60% slope

3 Moderate (moderately deep); 20-40 inches deep

4 Deep; 40-60 inches deep

5 Stony; stones 10-24 inches in size

6 Extremely gravelly; >60% gravels <3inches in size

7 Very shallow; <10 inches deep

Plant Community Description	Desired Conditions (Objectives)	
III. Tall Shrub Communities (mature shrub height greater than 38 inches)	Grass Cover Canopy (Basal)	Bare Ground Cover
<p>B. Mountain Shrub</p> <p>The mountain shrub plant community is a composite of numerous mountain shrub species with considerable variability of species present and composition. Included in this community are ceanothus (<i>Ceanothus spp.</i>), snowberry (<i>Symphoricarpos spp.</i>), serviceberry (<i>Amelanchier</i>), chokecherry (<i>Prunus spp.</i>), antelope bitterbrush (<i>Purshia</i>), and maple (<i>Acer spp.</i>).</p> <p>Elevation 6500-8500 feet; precipitation 15-20 inches.</p> <p>Typically occurs on moderate¹ to steep² mountain slopes (20->60%).</p> <p><u>Soil characteristics:</u> Moderate³ to deep⁴ loams and stony⁵ loams to extremely gravelly⁶ and stony loams.</p> <p><u>Vegetation:</u> Total cover ranges between 50-90%. Life form vegetation cover is shrubs 40-70%, grasses 10-20%, forbs 5-10%. These communities are shrub dominated with little herbaceous species due to the typically closed overstory. All these shrubs (with the exception of bitterbrush) are strong sprouters following fire disturbance. Periodic fire alters shrub cover and age class distribution. The dominant grasses include Idaho fescue, needlegrasses (<i>Stipa</i>) and mountain brome (<i>Bromus spp.</i>).</p> <p>Though a variety of forbs may be present they are generally not abundant.</p> <p><u>Total mountain shrub distribution:</u> 10 percent of the area has 10 to 20 percent shrub canopy cover; 20 percent of the area has 20 to 40 percent shrub canopy cover; 70 percent of the area has greater than 40 percent shrub canopy cover.</p> <p><u>Ground cover:</u> Surface rock and litter 25-50%; bare ground 5-10%.</p> <p>This plant community provides winter forage and thermal cover for deer and elk and may provide limited summer habitat for sage grouse.</p> <p>Fire frequency is frequent (15-35 years).</p>	≥10% (≥5%)	≤10%

1 Moderate (moderately steep); 10-30% slope

2 Steep; 20-60% slope

3 Moderate (moderately deep); 20-40 inches deep

4 Deep; 40-60 inches deep

5 Stony; stones 10-24 inches in size

6 Extremely gravelly; >60% gravels <3inches in size

Plant Community Description	Desired Conditions (Objectives)	
<p>IV. Mixed Perennial Grasslands</p> <p>The plant community description below is a composite of the Society for Range Management Rangeland Cover Type SRM 304 (Idaho fescue-Bluebunch wheatgrass), SRM 307 (Idaho fescue-Threadleaf sedge), and NatureServe's International Vegetation Classification (formerly International Classification of Ecological Communities) Idaho fescue-Bluebunch wheatgrass Association identified within the Northern Rock Mountain Montane Grassland Alliance. Thorough investigation of this plant community is needed on the S-C NF.</p>	Grass Cover Canopy (Basal)	Bare Ground Cover
<p>This plant community is named 'Mixed Perennial Grasslands' due to the wide variety of bunch grasses and sod forming grasses capable of occupying these locations.</p> <p>Elevation 5000-8500 feet; precipitation 15-20 inches.</p> <p>Typically occurs on gently sloping¹ to moderately steep² mountain slopes (1-30%).</p> <p><u>Soil characteristics:</u> Moderate³ to deep⁴ loams and stony⁵ loams to extremely gravelly⁶ and stony loams.</p> <p><u>Vegetation:</u> Total cover ranges between 50->90%. Life form vegetation cover is grasses 40-70%, forbs 5-35%, and shrubs <5%. Idaho fescue and Bluebunch wheatgrass are dominant or co-dominant. Other grasses include bluegrasses (<i>Poa</i>), oat grass (<i>Danthonia</i>), wild ryegrass (<i>Elymus</i>), junegrass (<i>Koeleria</i>), and needle grasses (<i>Stipa</i>), in addition to threadleaf sedge. Forb species composition varies, depending on aspect and elevation. Common forb species include yarrow (<i>Achillea</i>), pussytoes (<i>Antennaria</i>), lupine (<i>Lupinus</i>), sandwort (<i>Arenaria</i>), prairie smoke (<i>Geum</i>), and phlox (<i>Phlox</i>). Though a variety of forbs may be present they are generally not as abundant as the grass component.</p> <p><u>Ground cover:</u> Surface rock and litter 15-30%; bare ground 5-15%.</p> <p>This plant community provides spring and summer forage for deer and elk and may provide limited summer habitat for sage grouse.</p> <p>Fire frequency is frequent (15-35 years).</p>	≥40% (≥10%)	≤15%

- 1 Gently sloping; 1-8% slopes
- 2 Moderately steep; 10-30% slopes
- 3 Moderate (moderately deep); 20-40 inches deep
- 4 Deep; 40-60 inches deep
- 5 Stony; stones 10-24 inches in size
- 6 Extremely gravelly; >60% gravels <3inches in size

Plant Community Description	Desired Conditions (Objectives)	
<p>V. Dry-Semi Wet Meadow</p> <p>This plant community is not well documented as the variety and composition of species can vary considerably depending upon the short term (seasonal) and long term (cyclic) fluctuation of the water table. The description below is a composite of the Society for Range Management Rangeland Cover Type SRM 308 (Idaho fescue-Tufted hairgrass) and SRM 313 (Tufted Hairgrass-Sedge), NatureServe’s International Vegetation Classification (formerly International Classification of Ecological Communities) Idaho fescue-Tufted hairgrass Association identified within the Rocky Mountain Alpine-Montane Wet Meadow Alliance and the Tufted Hairgrass Temporarily Flooded Herbaceous Alliance, and the Targhee National Forest Ecological Unit Inventory Graminoid Cryaquolls Ecological Type. Thorough investigation of this plant community is needed on the S-C NF.</p>	Grass Cover Canopy (Basal)	Bare Ground Cover
<p>Elevation 6000->8500 feet; precipitation 15->30 inches with fluctuating water tables extending into but not throughout the growing season.</p> <p>Typically occurs on flat to gently sloping valley bottoms (1-5%).</p> <p><u>Soil characteristics:</u> Very deep (>60 inches) loams to silt loams.</p> <p><u>Vegetation:</u> Total cover ranges between 50-100%. Life form vegetation cover is grasses and grasslikes 60-100% and forbs 10-25%. Shrubs are generally lacking. These communities are typically grass and grasslike dominated with Idaho fescue, along with slender wheatgrass (<i>Agropyron</i>) and muhlenbergia (<i>Muhlenbergia spp.</i>) being common on the drier sites while hairgrass (<i>Deschampsia</i>) and sedges (<i>Carex</i>) are more common on the wetter sites. Forb cover and composition is quite variable and influenced by disturbances. Other common graminoids include bentgrass (<i>Agrostis</i>), rushes (<i>Juncus</i>), timber danthonia (<i>Danthonia</i>), timothy (<i>Phleum</i>), and bluegrass (<i>Poa</i>). Common forbs include prairie smoke (<i>Geum</i>), licorice root (<i>Ligusticum</i>), knotweed (<i>Polygonum</i>), and marshmarigold (<i>Caltha</i>).</p> <p><u>Ground cover:</u> Surface rock and litter 25-50%; bare ground 5-10%.</p> <p>This plant community provides late summer forage for deer and elk and may provide limited summer and late brood rearing habitat for sage grouse at lower elevations.</p> <p>Fire frequency is frequent (15-35 years).</p>	≥50 (≥10%)	≤10%

Upland Aspen Communities

Upland aspen communities are widely scattered throughout the Forest, generally occupying areas with deep, fertile soils with high water holding capacities, swales, snow pockets, or rock talus where additional moisture is captured.

There are several risks to the continued viability and health of upland aspen stands. Conifer encroachment and removal of natural site disturbances alter normal age class distribution and the natural regeneration of aspen clones.

Livestock grazing has the potential to adversely affect aspen viability by browsing young stems and trampling. To ensure livestock grazing does not adversely affect aspen viability, the following objectives and standards are recommended. These recommendations are based on a thorough literature review and summary presented in a white paper written by Jennifer Purvine, Wildlife Biologist Challis Ranger District. Objectives apply to aspen stands that have not received any treatments such as prescribed fire or vegetation manipulation.

Objectives:

- A. Aspen regeneration greater than 500 stems per acre (1" to 8" dbh, 5 to 15 feet tall) and greater than 500 suckers per acre (<1" stem diameter, <5 feet tall) as a minimum number in the absence of disturbance, i.e. fire.
- B. Conifer cover <25%.
- C. Aspen cover >40%.
- D. Sagebrush cover <10%.

Indicator Use Values:

- A. Current terminal leader nipped on $\leq 20\%$ of stems

Aspen stand condition will be assessed using the protocol from the Aspen Delineation Project (2002). Those stands resulting in a risk factor greater than 'moderate' will be assessed further in regards to conifer encroachment and aspen regeneration success. Stands with greater than 50% conifer cover have the highest risk of stand loss regardless of regeneration success. Until conifer encroachment is addressed, proactive livestock management would not be effective since the condition of the stand is affected by other factors. On those stands with less than 50% conifer cover and aspen regeneration is not occurring or is unsuccessful ('moderate' risk), a determination must be made as to whether or not livestock are a contributing cause. If livestock browsing is a contributing factor to the lack of regeneration, livestock browsing indicator use values will be applied as described above. If the aspen regeneration objectives are being met but livestock have access to the aspen stand and pose a risk to the stand's continued viability and health an annual indicator use value of <40% will be applied.

These objectives and indicator use values closely parallel those described in A Strategy for Managing Livestock Grazing within Riparian Communities on the Salmon-Challis National Forest (Gamett, et al., 2005). Protocols for monitoring aspen browsing and evaluating age distribution and stand condition have been formulated using guidelines from the Aspen Delineation Project (2002), Jones et al. (2005), and USDA Forest Service (2004). The protocol for estimating aspen regeneration and monitoring browsing use is attached in Appendix 1.

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Appendix 1: Aspen Regeneration and Browsing Monitoring Protocol

Aspen Regeneration

The density of aspen stems can be measured using a simple technique described in the Aspen Location and Condition Protocol (Aspen Delineation Project 2002). After measuring several aspen stands using this technique, adequate estimates can be made without actually taking measurements.

Toss a rock twenty times randomly (behind your back) into areas of a stand that are representative of the distribution of suckers in the stand. Use a 3.75 foot radius pole and count the number of “hits” within the circle around the rock. Add up the total number of “hits” from the twenty samples and divide by 20. Multiply this number by 1000. The result is the number of suckers per acre. It only takes 10 hits using this procedure to obtain the desired aspen sucker regeneration objective [$10/20 \times 1000 = 500/\text{acre}$].

Aspen Browsing

The following is a modification of the protocol described in the Browsed Plant Method for Young Quaking Aspen (USDA Forest Service, 2004). Aspen use will be based on percentage of plants browsed as measured on plants less than five feet in height. Browse use levels will be determined based upon a count of individual plants that have terminal buds on primary stems of the current year’s growth either intact or removed. It must be understood that this protocol is an estimation of incidence of use and is not comparable to a percent utilization.

Upland aspen stands on the Salmon-Challis National Forest are typically isolated patches often less than one acre in size. Measuring aspen browsing within these small stands using a line transect is difficult. In these situations it is suggested to run two line transects dissecting the stand laterally across its two dimensions (i.e. north to south and east to west).

Select the starting point and direction for transect 1. Choose a line of sight target point to maintain the transect direction during pacing. A simplified version of the Nearest Plant Technique (USDI BLM, 1996) will be used to determine which individual plants to sample along the paced transect. A pace is two steps. Select the number of paces between samples that will be needed to adequately traverse the aspen stand. At each sample location select the nearest aspen plant less than five feet in height. Record on the Aspen Incidence of Browsing Form an “X” if the plant’s terminal leader has been browsed or a “—” if it has not been browsed. The nearest plant is selected within 180 degrees and one pace from the sample location. If no plants are within this zone, do not record any hits and continue pacing along the transect. A minimum of 30 samples should be taken. At the end of transect 1 move around the stand and select a starting point and direction for transect 2 that dissects the stand in the opposite dimension. Repeat the process as in transect 1. The percent of incidence of browsing is calculated by adding up all the browsed hits and dividing by the total number of samples.

Aspen Incidence of Browsing Form

Allotment Name: _____
 Pasture Name: _____
 Monitoring Area Name/Number: _____
 Date Completed: _____
 Completed by: _____

Mark with a "X" when the terminal leader is browsed and a "--" when not browsed

Transect Description:				Transect Description:			
Plant	Browsed?	Plant	Browsed?	Plant	Browsed?	Plant	Browsed?
1		31		1		31	
2		32		2		32	
3		33		3		33	
4		34		4		34	
5		35		5		35	
6		36		6		36	
7		37		7		37	
8		38		8		38	
9		39		9		39	
10		40		10		40	
11		41		11		41	
12		42		12		42	
13		43		13		43	
14		44		14		44	
15		45		15		45	
16		46		16		46	
17		47		17		47	
18		48		18		48	
19		49		19		49	
20		50		20		50	
21		51		21		51	
22		52		22		52	
23		53		23		53	
24		54		24		54	
25		55		25		55	
26		56		26		56	
27		57		27		57	
28		58		28		58	
29		59		29		59	
30		60		30		60	

Percent Browsed [(Plants Browsed/Plants Sampled) x 100]: _____ %

Comments: _____

Appendix 2: Lost River Inventory Protocol

Protocol for Line Intercept Transect and Daubenmire Canopy Cover and Height Class Method

Materials Provided by the Forest Service:

- Data forms including:
 - Line Intercept and Daubenmire Canopy Cover and Height Class Transect Form (2-sided)
 - Site Forb Abundance Form
- 18 inch x ½ inch rebar, aluminum caps, and aluminum tags
- Map with study sites identified.
- Aerial photographs of general area
- Study location form

Materials Provided by the Contractor

- Hammer
- Tape, 100-foot (marked in 1/10 inch increments)
- Stakes for tape (at least two spikes; old, medium-large screwdrivers work well)
- Daubenmire frame 20x50 cm
- Yardstick (for measuring shrub and grass/forb heights)
- Compass
- 35 mm camera and print film; extra camera battery; extra film
- Digital camera
- Photo cards and markers; or small dry-erase board and marker
- Rod to hold photo card
- GPS unit – Trimble or Garmin
- Pencils
- Calculator
- Pruning shears and/or saw
- Duct tape

Protocol:

1. The Forest Service will select the study sites and will provide the contractor with an aerial photograph and/or a topographic map showing the location of the study sites (lat., long., UTM). Each site will have 3 line intercept transects with microplots located parallel with the contour of the land. Each line intercept transect should be located at least 10 feet from the adjacent transects previously located. The observer will need to use personal judgment in locating transects to avoid transition zones between soil types, or atypical vegetation patterns that are not representative of a broader topographic feature of slope and aspect. See attached drawing of transect layout.
2. Locate the study site on the ground using the Trimble or Garmin GPS unit, aerial photograph, and/or a topographic map provided by the Forest Service. The study site must be at least 0.25 miles from disturbances such as roads, water sources etc. If this is not the case, adjust the location of the study site appropriately. This point is the zero point of the transect.
3. Mark the zero point of the transect using the following procedure:
 - a. Insert a ½“ rebar into ground 9 inches
 - b. Attach an aluminum cap to rebar and stamp the plot number on cap
 - c. On an aluminum tag scribe the words “Range Study,” the plot number, and the date. Attach the aluminum tag to the rebar at ground level.

4. Determine the latitude and longitude/UTM of the zero point of the transect using a GPS unit. The location must be accurate to ± 10 m. Record the latitude and longitude on the form in decimal degrees carried out to at least 4 decimal places (e.g., 43.9654°N, 113.3648°W).
5. Anchor the 100-foot tape with a stake (spike, screwdriver, etc.) to the zero point of the transect and extend it snugly along the azimuth. Secure the end with a second stake.
6. On the data form, record shrub canopy cover by sub-species of sagebrush using the line intercept method. Record canopy cover increments to the nearest 0.1 ft. Record live (green) canopy and dead canopy separately. Ignore spaces or gaps in the canopy less than 0.2 feet across. Gaps in the canopy in excess of 0.2 feet will not be included as canopy intercepts.
7. At each 5-foot increment along the tape, starting at the 5 foot mark, ending at 100 foot mark:
 - a. Place a 20 x 50 cm Daubenmire frame (n=20 plots per transect). For each plot, estimate and record cover for perennial and annual grasses, perennial and annual forbs, total vegetation, bare ground, rock, litter, and lichen. Record cover class. Note predominant species (Ecological Type-line intercept record form).
 - b. Measure to the nearest inch the maximum height for the nearest sagebrush plant. Record height class.
 - c. At each 5-foot increment point record the average “natural” height of 3 perennial grasses **or** perennial forb within the 20 x 50 cm frame. If no plants are within this arc then record a dash and move on to next point. [Natural = the highest point of a leaf or seed stalk with no straightening by the observer]
8. Summarize data: add mid points per cover and height classes, divide by 20 to record averages in right column.
9. Photographs will be taken in the manner and locations described below. Both a digital image and a high quality 35 mm print image will be taken at each location. Digital images must have a resolution of at least 1600x1200 pixels. The photo card must be readable in each image.
 - a. Complete a photo card with the following information:
 - i. Date
 - ii. Location (latitude/longitude)
 - iii. Allotment
 - iv. Pasture
 - v. Plot number
 - vi. Live and dead sagebrush canopy as determined from the line transect
 - b. Take photographs of the following locations:
 - i. General area. With tape still in place, take photographs in each of the cardinal directions (North, East, South, West) with skyline in background. Take photographs while standing at the zero point of the transect at a camera height of approximately 5 feet with the camera level.
 - ii. General area showing transect. With tape still in place, take photograph while standing at the zero point of transect at a camera height of approximately 5 feet sighting down the transect. Show landmarks and/or the skyline in the background to the greatest extent possible while still including transect and tape in the photograph.
 - iii. General transect. With tape still in place, picture is taken while standing at the zero point of transect at a camera height of approximately 5 feet sighting down transect. The 50-foot point of the tape is centered in the photograph.
10. Complete the Site Forb Abundance Form.
11. Select the sagebrush plant closest to the “zero” end of tape. Cut this plant at ground level to determine the age of the plant. Bases will be collected for age analysis. Sagebrush bases will be wrapped with duct tape to label plot number and prevent plant stem from falling apart. The bottom of the base will be identified on the duct tape. Once the age of the plant is determined, record the age on the form. A hand lens and water bottle may be needed to sharpen the growth ring image. Add 4 years to the number of growth rings counted (sagebrush plants may not develop rings first 4 years).
12. Conduct a pellet count inventory along the 100 foot transect, utilize a plot size of 6' X 100'; 3 feet each side of transect line. Record elk, deer, cattle, antelope and grouse pellet groups within the plot on the form.

13. Conduct a sage plant density count within the 100' x 6' plot, record the number of sagebrush plants within the plot on the form.
14. Establish a second transect 10 feet below and parallel to the zero point of transect 1. Conduct steps 5-13 for transect 2.
15. Establish an additional transect 10 feet below and parallel to the zero point of transect 2. Conduct steps 5-13 for transect 3. Make sure all transects are clearly numbered
16. Upon daily completion of field work, submit the following to the Forest project representative.
 - a. A file folder containing the following for each site (see example):
 - i. Narrative report, describing the general site topographic and geographic site characteristics (e.g. hydrologic unit, slope, aspect, elevation, soil texture), general vegetation description.
 - ii. GIS map or 7.5' USGS topographic map with the location of the study site
 - iii. Line Intercept Form including data summary
 - iv. Daubenmire Canopy Cover Transect Form including data summary
 - v. Site Forb Abundance Form
 - vi. Mounted and labeled photographs including:
 1. General area – North
 2. General area – East
 3. General area – South
 4. General area – West
 5. General area showing transect
 6. General transect – 50 foot mark centered in photograph
 - vii. Labeled film canister for developing.
 - b. Labeled sagebrush bases used to determine age for each plot
 - c. Disk containing labeled digital images
17. Completed files will be submitted by allotment for review as completed unless approval is given otherwise. Forest project representative will turn film in for developing, initially review the data and organize it into a six-way file for each allotment with each unit/pasture data on its own page.

LINE INTERCEPT RECORD

Forest:		District:				Allotment:				
Study Name and/or Number:						Ecological Type:				
Conducted By:						Date:				
Location: Lat:		Long:		, Site Name/#		T	R	Sec	$\frac{1}{4}$	$\frac{1}{4}$
Species:		Species:		Species:		Species:		Sage Height:		
Live	Dead	Live	Dead	Live	Dead	Live	Dead	Measure Closest Plant		
								0'		
								50'		
								100'		
								Photo Log		
								Roll #	Picture #	
								Slope:		
								Aspect:		
								Age of Sage:		
Total Inches:		Total Inches:		Total Inches:		Total Inches:				
% Canopy		% Canopy		% Canopy		% Canopy		% Canopy=Total in/1200		

Daubenmire Canopy Cover/Height Class Transect															
	1	2	3	4	5	6	7	8	9	10	Total % CC	Ave. Ht.	Legend		
Bare ground														Cover Class	Height Class
Grass															
Forb															
Shrub/Tree															
Rock															
Lichen														Cover Class Codes Md. Pt.	
Litter															
Veg. Total														1 = 0-1	.5
Grass Species:													2 = 1-5	3	
	/	/	/	/	/	/	/	/	/	/			3 = 5-25	15	
	/	/	/	/	/	/	/	/	/	/			4 = 25-50	37.5	
	/	/	/	/	/	/	/	/	/	/			5 = 50-75	62.5	
	/	/	/	/	/	/	/	/	/	/			6 = 75-96	85	
	/	/	/	/	/	/	/	/	/	/			7 = 95-100	97.5	
	/	/	/	/	/	/	/	/	/	/			Height Classes (In.) Md.Pt.		
	/	/	/	/	/	/	/	/	/	/			1 = 0-3	1.5	
Shrub Species:													2 = 3-6	4.5	
	/	/	/	/	/	/	/	/	/	/			3 = 6-9	7.5	
	/	/	/	/	/	/	/	/	/	/			4 = 9-12	10.5	
	/	/	/	/	/	/	/	/	/	/			5 = 12-15	13.5	
	/	/	/	/	/	/	/	/	/	/			6 = 15-18	16.5	
	/	/	/	/	/	/	/	/	/	/			7 = 18-24	19.5	
	/	/	/	/	/	/	/	/	/	/			8 = 24-30	22.5	
	/	/	/	/	/	/	/	/	/	/			9 = 30+		

	11	12	13	14	15	16	17	18	19	20	Total % CC	Ave. Ht.	
<u>Bare ground</u>													<u>Sage Density Count</u>
<u>Grass</u>													100' x 6' Plot
<u>Forb</u>													# of Sage Plants
<u>Shrub/Tree</u>													
<u>Rock</u>													
<u>Lichen</u>													
<u>Litter</u>													
<u>Veg. Total</u>													Pellet Count
Grass Species:												100' x 6' Plot	
	/	/	/	/	/	/	/	/	/	/			Elk:
	/	/	/	/	/	/	/	/	/	/			Deer:
	/	/	/	/	/	/	/	/	/	/			
	/	/	/	/	/	/	/	/	/	/			Cow:
	/	/	/	/	/	/	/	/	/	/			Antelope:
	/	/	/	/	/	/	/	/	/	/			
	/	/	/	/	/	/	/	/	/	/			Rabbit:
Shrub Species:												Grouse:	
	/	/	/	/	/	/	/	/	/	/			
	/	/	/	/	/	/	/	/	/	/			
	/	/	/	/	/	/	/	/	/	/			
	/	/	/	/	/	/	/	/	/	/			
	/	/	/	/	/	/	/	/	/	/			

Appendix 3: North Zone Inventory Protocol (Instructions and Forms)

Simplified Point Step Instructions

Select the transect site. Design the transect to run along the contour staying in the same plant community within the original old data polygon. Keep in mind that with the PS transects we are observing and sampling upwards of 500-600 feet in length. Keep away from roads, fences, and other livestock facilities.

Choose a line of sight target in the background or on the horizon to direct your pacing.

Pound in a rebar stake; use the yellow caps and aluminum tags for identification. GPS the location. Fill out the photo board with allotment, pasture, study number, and date. Take at least one photo looking down the transect route with the target in the frame. Flag a nearby bush to relocate the starting point.

Fill in all the header information on the form.

A pace is two steps. Keep a steady pace length; do not stretch a step to go over a shrub. Do not look down or bias your step placement.

At each pace (two steps), stop, extend your arm, and vertically descend a pin flag. Do not look at where it is going. Once it has hit the ground look to see precisely what it has hit.

Ground cover is what it hit on the ground and the levels (level 1, 2, 3, etc) is what it hit on the way down. If only ground cover is hit with no overstory, a dot count is placed in the appropriate box representing the five types of ground cover. Overstory is recorded by level (level 1 being the first level above the ground hit, level 2 being over level 1, etc).

Precise observations are required to interpret if and what overhanging leaf or twig matter was hit. Same care should be used with ground cover and plant basal hits.

Record each individual occurrence on the form and record a dot count. When an occurrence repeats itself record another dot. Use additional sheets when necessary.

After 100 hits are recorded along the transect move upslope or downslope 20-30 feet or so and run a return transect to another target (not your starting point, but nearby). Describe your two targets in the notes on the form. A talley counter is handy, but count your hits to make sure your points are 100 out and 100 back.

Try to identify all the commonly occurring plants on the transect. Bringing samples back to the office is usually the easiest way because someone usually knows. Other perennial forbs (PPFF) can be used for the occasional unknown forb.

List other plants observed but not hit along the transect in the notes. Record the presence of all noxious weeds.

Note: Identifying where to run the transect is, as before, a judgment call. We need to represent, as best we can the original polygon and with this method we can afford to re-sample many more polygons than originally anticipated, reducing the need to stratify.

Materials

½" X 18" rebar
hammer
GPS Unit

yellow 'Range Study' caps
flagging
Digital or film camera

aluminum ID tags
pin flag or welding rod
Photo board with pen

Appendix 4: Rangeland Health and Function Evaluation Example; Agency Creek Allotment

The Agency Creek Allotment is managed under a coordinated management plan with the BLM, and in 2004 incorporated the adjoining Warm Springs and Pattee Creek Allotments. Three different cow/calf herds rotated between 13 BLM and 8 FS pastures from mid-May to mid-October.

The Agency Creek Allotment was inventoried in 2004 using the North Zone Inventory Protocol. A total of 12 transects were sampled in 2004 that represented 16 sampled polygons from the 1963 range analysis inventory. The 16 polygons represented approximately half the grazed area within the allotment (coded as S3, S4, and S6). About 25% of the sampled grazed areas were mapped as unsuitable for livestock grazing (coded as U4 and U6). The 2004 data was summarized and tabulated on four Excel spreadsheets (titled Administration, Current Vegetation, Green Sheet, and Indicator Comparison). The table shown below in this rangeland health and function evaluation example is a composite of the four spreadsheets focusing on the pertinent rangeland health indicators. It should be noted that the inventory was completed prior to livestock grazing during late June and early July when rangeland plants are actively growing. It was also noted that elk use was significant in late winter through early spring throughout the allotment.

As discussed above, the four indicators of rangeland health and function are percent bare ground, species cover composition, percent cover and distribution of sagebrush, and presence of noxious or invasive weeds. Four different plant communities were sampled during the 2004 inventory on Agency Creek; four sites on mountain sagebrush-bluebunch wheatgrass (ARTRV/AGSP), four on mountain sagebrush-Idaho fescue (ARTRV/FEID), one on three-tip sagebrush-bluebunch wheatgrass (ARTR4/AGSP), and three on mixed perennial grasslands (MP GRASS).

Comparing the inventory data to the desired conditions for each of the described plant communities provides the following evaluation and conclusions.

Mountain big sagebrush/Bluebunch wheatgrass (ARTRV/AGSP): The percent bare ground is within the allowable maximum of 20% at all locations. The total grass cover composition (ranging from 29.5 to 38.5%) is greater than the minimum for this site (23%) and the major species are the indicator species of bluebunch wheatgrass and Idaho fescue. However, the basal measurements are somewhat low with two sites being less than the anticipated 3%. The shrub cover is dominated by mountain big sagebrush and ranges between 16.5% and 35%, within the desired distribution. The percent of forbs is fairly high (20-30%) due to the season and there were no noxious weeds encountered or observed. Conclusion: The Mountain big sagebrush/bluebunch wheatgrass sites sampled on this allotment are meeting the desired conditions and are healthy and functioning.

Mountain big sagebrush/Idaho fescue (ARTRV/FEID): The percent bare ground is within the allowable maximum of 20% at all but one location measured at 22%. The total grass cover composition (ranging from 25.5 to 41.5%) is greater than the minimum for this site (25%) and the major species are the indicator species of Idaho fescue and bluebunch wheatgrass. However, the basal measurements are somewhat low with three sites being less than the anticipated 4%. The shrub cover is dominated by mountain big sagebrush and ranges between 15 and 24% well within the desired distribution. The percent of forbs is fairly high (23-34%) due to the season and there were no noxious weeds encountered or observed. Conclusion: The Mountain big

sagebrush/Idaho fescue sites sampled on this allotment are meeting the desired conditions and are healthy and functioning.

Three-tip sagebrush/Bluebunch wheatgrass (ARTR4/AGSP): The percent bare ground is within the allowable maximum of 20%. The total grass cover composition at 29.5% is greater than the minimum for this site (24%) and the major species are the indicator species of Idaho fescue and bluebunch wheatgrass. However, the basal measurements for the one site are somewhat low at 1.5% compared to the expected 4%. The shrub cover is dominated by three-tip sagebrush (along with some mountain big sagebrush) measured at 15%. The percent of forbs is relatively low (5.5%) especially for the season but there were no noxious weeds encountered or observed. Conclusion: The Three-tip sagebrush/bluebunch wheatgrass site sampled on this allotment is meeting the desired conditions and is healthy and functioning.

Mixed Perennial Grassland (MP GRASS): Two of the three sampled grassland sites met the maximum bare ground level of 15%; however one site had excessive amounts of bare ground measured at 51.5%. Total grass cover was also either over the expected amount of 40% or close at 38.5% at one site. Bluebunch wheatgrass and Idaho fescue were well represented at both these sites. One site (AC-6) had very low grass cover measured at only 10.5%. This site also had very low measurements of the desirable species and was dominated by foxtail barley (*Hordeum jubatum*) a grazing induced increaser. Forb cover ranged from 19 to 36% and no noxious or invasive weeds were observed. Shrubs were lacking. Conclusion: Two of the three mixed perennial grassland sites sampled are meeting the desired conditions and are healthy and functioning. One site (AC-6) is not meeting the bare ground or species cover desired conditions and therefore is considered “at risk.”

The final step is to interpret the findings for significance and management needs using the step-by-step strategy on page 6. Only one sample site (AC-6) failed to meet the described desired conditions. The site does represent the Mixed Perennial Grassland community type within the pasture; however the type is relatively rare. The site has been disturbed but it's uncertain whether livestock are a significant cause given the abundance of elk pellets, the rarity of cow pies, the site's isolation and the lack of available livestock water. In this situation it can be determined that a change in management is not warranted. Monitoring could include establishing a photo point and periodically monitoring forage use to substantiate these conclusions.

The 12 inventory locations sampled in 2004 are considered representative of the four dominant plant communities occurring on the Forest Service administered lands on the Agency Creek Allotment. It can be concluded that the non-forested rangelands in the Agency Creek Allotment are “in satisfactory condition, healthy, and functional.”

Agency Creek Allotment Inventory Data Evaluation Summary

Study Number	% Bare Ground (B+P) ¹	% Rock & Litter	% Total Vegetation	% Grass Cover Canopy/Basal	% Forb Cover Canopy/Basal	% Shrub Cover Canopy/Basal	% Cover AGSP Canopy/Basal	% Cover FEID Canopy/Basal	% Cover ARTR Canopy/Basal	Plant Community Comments
AC-1	11.0	15.5	78.0	34.5/4.0	19.5/3.0	26.0/.5	15.5/1.0	12.0/2.5	26.0/.5	ARTRV/AGSP
AC-2(65)	11.0	16.5	72.5	35.0/2.5	24.5/4.0	32.5/2.5	18.5/1.0	14.5/1.5	32.5/2.5	ARTRV/AGSP complex
AC-2a(35)	12.0	17.0	69.0	37.0/9.0	18.0/18.0	0/0	10.0/2.0	22.0/5.0	0/0	MP GRASS complex
AC-3	12.5	21.0	68.0	35.0/6.5	20.0/4.0	14.5/.5	12.0/1.0	16.0/3.5	14.5/.5	ARTRV/FEID
AC-4	11.0	22.5	70.0	34.5/2.5	18.5/1.5	27.7/.5	19.5/.5	7.5/1.0	26.5/.5	ARTRV/AGSP
AC-5	16.0	26.0	61.5	28.0/3.5	26.5/3.5	14.5/2.0	12.5/2.0	1.5/0	14.5/2.0	ARTRV/AGSP
AC-6	51.5	21.0	48.5	10.5/1.0	32.5/3.0	0/0	.5/0	.5/0	0/0	MP GRASS
AC-7	13.0	25.0	64.0	24.0/1.5	31.0/3.0	14.5/.5	7.5/0	13.5/1.5	14.5/.5	ARTRV/FEID
AC-8(60)	14.5	32.5	53.0	34.5/4.0	17.0/2.0	1.0/0	15.5/1.0	11.5/1.5	0/0	MP GRASS complex
AC-8a(40)	22.0	23.0	64.0	23.0/4.0	22.0/1.0	24.0/0	7.0/1.0	13.0/1.0	24.0/0	ARTRV/FEID complex
AC-9	19.0	35.0	47.0	26.5/3.0	5.0/.5	7.5/0	13.5/1.5	8.5/.5	7.5/0	ARTR4/AGSP
AC-10	13.0	25.0	64.0	24.0/1.5	31.0/3.0	14.5/.5	7.5/0	13.5/1.5	14.5/.5	ARTRV/FEID

¹ B = bare ground; P = pavement (rock fragments < ¼ inches diameter)