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Intermountain Region Greater Sage-grouse Vegetation Implementation Guide

USDA FOREST SERVICE

Contents

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Introduction

NOTE: This Draft Vegetation Implementation Guide is Version 2.0. Modifications and revisions are expected as field application and review occurs.

This guide is intended to provide recommended process and protocols to be used to comply with the greater sage-grouse Forest Plan Amendments for vegetation management. The Forest Plan Amendments provide the required direction and this guide is not intended to add or remove any direction found in the Forest Plan Amendments.

This guide is designed to:

- Provide guidance on how to plan and implement vegetation management projects in greater sage-grouse (GRSG) habitat.
- Provide clear processes to be used to assess/evaluate vegetation attributes that contribute to GRSG habitat.
- Provide protocols for implementing Grazing Guidelines

Vegetation Management

Vegetation management direction in the GRSG LMP Amendments is designed to address threats to GRSG habitat in the following ways:

- Establish Vegetation Desired Conditions (Table 1, Nevada Tables 1a 1b).
- Focus vegetation treatments in areas of habitat that are most important for GRSG seasonal habitats and have the highest probability for success.

Vegetation Desired Conditions

The GRSG Records of Decision (RODs, USFS Great Basin Region, USFS Rocky Mountain Region) contain the following landscape-scale desired condition: In GRSG habitats, including all seasonal habitats, 70% or more of lands capable of producing sagebrush have from 10 to 30% sagebrush canopy cover and less than 10% conifer canopy cover. In addition, within breeding and nesting habitat, sufficient herbaceous vegetation structure and height provides overhead and lateral concealment for nesting and early brood rearing life stages. Within brood rearing habitat, wet meadows and riparian areas sustain a rich diversity of perennial grass and forb species relative to site potential. Within winter habitat, sufficient sagebrush height and density provides food and cover for the GRSG during this seasonal period.

Each Land Management Plan (LMP) also contains a table that identifies specific desired conditions based on seasonal habitat for GRSG at the landscape scale (Table 1 in most LMP amendments, Tables 1a and 1b in the Nevada plan amendment). These desired conditions summarize the suite of characteristics that represent seasonal habitat needs for GRSG as

identified by research and monitoring. The Habitat Assessment Framework can be used to evaluate maintenance of or progress toward desired conditions in defined areas such as restoration project areas, range allotments, and wild horse and burro territories.

Habitat Assessment Framework

The Habitat Assessment Framework describes 4 orders of habitat selection by greater sage-grouse. First order is the range-wide scale and includes all GRSG habitat. Second Order is the population scale. Third order is the seasonal habitat scale within a population and was used to define desired conditions for seasonal habitats in the Forest Plan Amendments. Fourth order is the site scale.

1. Forests use the USFS Vegetation Monitoring and Assessment Tool to evaluate data layers for Preliminary Seasonal Habitat.
2. Forests complete 3rd Order Habitat Assessment using the USFS Vegetation Monitoring and Assessment Tool following the process described in the Sage-grouse Habitat Assessment Framework and completing Form F-1. Note: When assessing habitat condition at the 3rd order scale, use the 1000 m Region 4 sampling grid to locate 35 or more plot locations; these can include all condition inventory plots that have been completed in previous years where available, Forests can use existing All-Condition Inventory (ACI) plots (non-forested FIA grid plots) to help inform sagebrush availability at the third order). While the ACI data uses line intercept instead of line-point intercept, it still informs the assessment, and plots should be subtracted from the total number of plots desired in this step. Regional Staff will evaluate the all condition inventory plots and provide Forests with the number of plots and locations needed to determine habitat condition at the 3rd order scale.

3. Forests determine allotments where Grazing Authorization NEPA is planned within 3-5 years. These allotments should be prioritized for completing 4th Order HAF plots. 4th order HAF sampling should also be prioritized for habitat restoration or other vegetation management project areas.

4. Use the Region 4 Intensified Grid at the appropriate scale (see "Sample Design and Plot Selection" (Appendix A). :
    a. For 4th Order HAF analysis of grazing allotments and habitat improvement projects.
    b. For determining habitat capability to achieve perennial grass heights required by the grazing guidelines for breeding and nesting habitat.
    c. For monitoring compliance with grazing guidelines within breeding and nesting habitat.
    d. If a plot must be rejected or offset (Appendix B), document reason.
    e. Field crews collect the data on the plot according to 4th Order HAF Protocol. Data will be recorded on tough books or tablets using VGS software.

Identifying Threats and Setting Management Priorities

The Conservation Objectives Team Report (U.S. Fish and Wildlife Service. 2013. Greater Sage-grouse (*Centrocercus urophasianus*) Conservation Objectives: Final Report. U.S. Fish and Wildlife Service, Denver, CO. February 2013) identified invasive plants and conifer encroachment as threats to GRSG habitat. Other researchers and managers have identified wildland fire as a primary threat to habitat. These threats should be considered when deciding upon locations for vegetation treatments.

Vegetation Treatments - Habitat Restoration

Direction for vegetation management and vegetation treatments in GRSG habitat is found in the LMP amendments in the following sections: General Greater Sage-grouse, Greater Sage-grouse Habitat, and Fire Management. In addition, a number of publications have emerged in the last 2 years that provide guidance on sagebrush restoration. These include the Fire and Invasives Assessment Team (FIAT) report (2014), and several Forest Service General Technical Reports and US Geological Survey reports that emphasize the need to focus restoration activities on specific vegetation communities important to GRSG seasonal habitats.

When conducting site-scale vegetation treatments in GRSG seasonal habitats, 4th order HAF should be used to assess existing habitat conditions. Sampling details are included in Appendix A: US Forest Service GRSG Vegetation Sampling Protocols. Also, review *A Field Guide to Selecting the Most Appropriate Treatment in Sagebrush and Pinon-Juniper Ecosystems in the Great Basin (RMRS GTR-322-rev. November 2014)*, and use the flow chart in Figure 1 to ensure adherence to plan standards and guidelines.

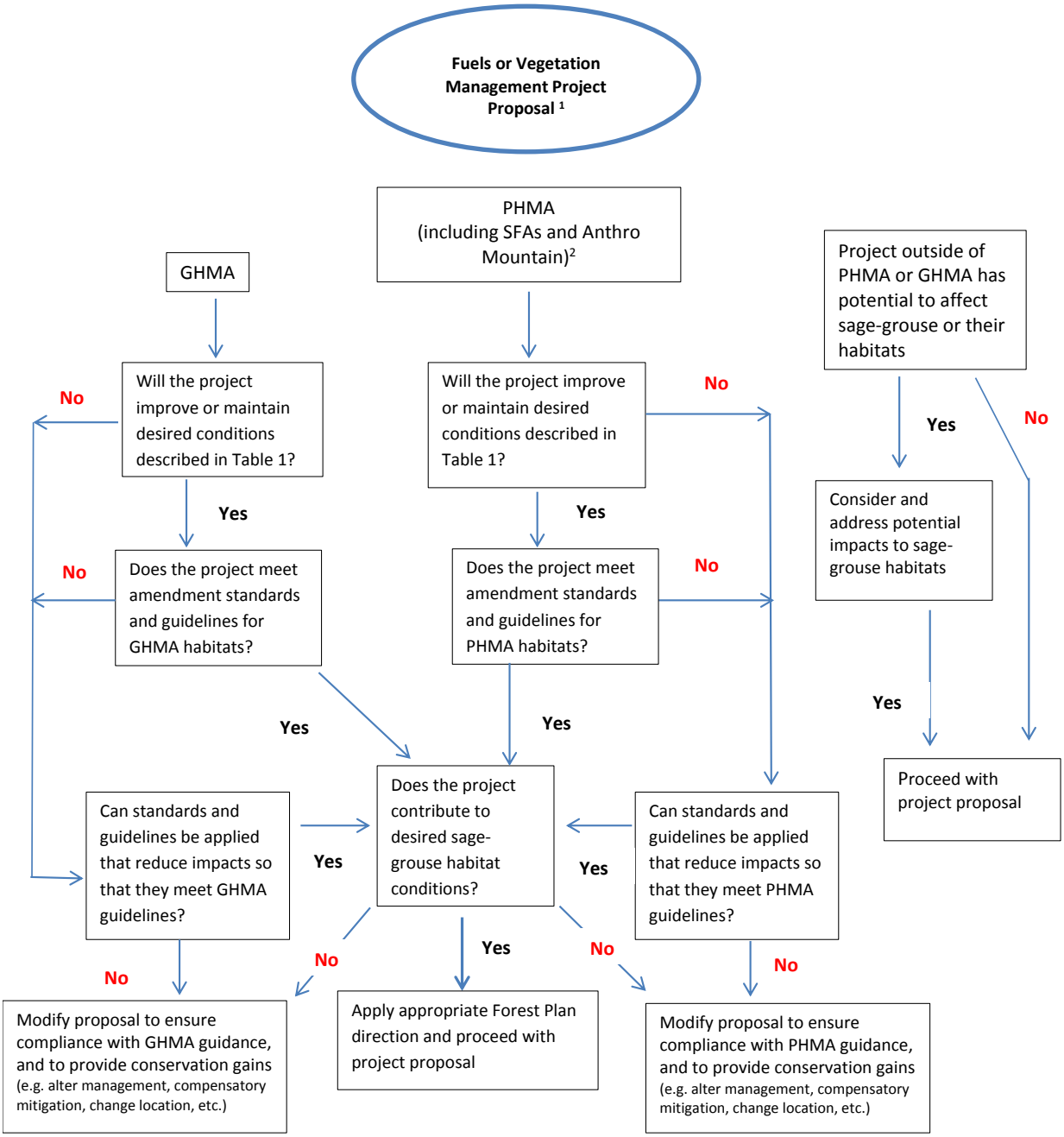


Figure 1. ***Flowchart for evaluating fuels and vegetation management project proposals in greater sage-grouse habitat.*** *(1) Note: Habitat conditions for greater sage-grouse will be assessed and monitored using protocols in the Greater Sage-Grouse Habitat Assessment Framework (Stiver et al. 2015). Data collected to support planning and project efforts will use appropriate scale data collection and analysis methods defined in the Framework. This will help ensure consistency in data sharing across administrative boundaries and is important in assessing the efficacy of management actions. Additional advice is provided in the GRSG Habitat Implementation Guide. (2) Specific management direction for General Habitat Management Areas (GHMAs) and Priority Habitat Management Areas (PHMAs), including Sagebrush Focal Areas (SFAs) and Anthro Mountain, is found in the land management plan amendments.*

Fire and Invasives Assessment

The purpose of the Fire and Invasives Assessment Team is to assess threats to GRSG and its habitat from wildfire, invasive species, and conifer encroachment. The FIAT concept originated from the LMP amendment process as a means to provide certainty to the US Fish and Wildlife Service (USFWS) that the US Forest Service and Bureau of Land Management (BLM) are committed to the conservation of GRSG habitat. The BLM, in coordination with multiple partners across the Great Basin, conducted a BLM-led FIAT process that included small portions of National Forest System (NFS) land, but did not look at all NFS land within GRSG habitat. The Forest Service made the commitment in the GRSG RODs for the Great Basin and Rocky Mountain Regions to assess all GRSG habitat specific to each forest or grassland.

The Forest Service FIAT is a threat-based assessment that provides a list of findings, recommendations, and considerations to protect, maintain, and enhance GRSG habitat. The assessments include a spatially consistent, repeatable landscape prioritization process to capture principles of resistance to invasive annual grasses and resilience to disturbance. Lastly, the assessments prioritize GRSG habitat areas for treatment based on the likelihood and severity of impacts from wildland fire, invasive species, and conifer encroachment and the availablilty or need for fire operations, fuels management, restoration, and burned area rehabilitation.

The intent of the landscape prioritization is to help inform where management actions and out-year program planning would be most advantageous for the forest or grassland to conserve, protect, and enhance GRSG habitat. Upon completion of the Forest Service FIAT, each forest/grassland will receive a written narrative containing a list of recommendations and considerations and the geospatial data layers used in the landscape prioritization process. FIAT assessments are based on recent scientific research on resistance and resilience of Great Basin ecosystems (Chambers et al. 2014). The USFWS sponsored the project in collaboration with the Western Association of Fish and Wildlife Agencies (WAFWA). An interdisciplinary team provided additional information on wildland fire and invasive plants and developed strategies for addressing these threats. This collaboration among between rangeland scientists, wildland fire specialists, and GRSG biologists from multiple state and federal agencies resulted in the development of a strategic, multi-scale approach for applying ecosystem resilience and resistance concepts to manage threats to GRSG habitats (Chambers et al.2014).

Relationship between Vegetation Objectives and the FIAT Process

Vegetation objectives included in LMP amendments were developed by a team of landscape ecologists using state and transition models from LANDFIRE that were modified to reflect disturbance regimes in the Great Basin. The Vegetation Dynamics Development Tool was used to determine the amount of vegetation treatment necessary to manage habitat to meet desired conditions.

Part of the Forest Service FIAT process is to provide a suite of geospatial data to produce a graduated scale of suggested priorities from very low to very high that can be used to assign a program of work and specific forest priorities to meet the objectives stated in the ROD. The Forest Service FIAT process evaluates the objectives in combination with local knowledge and data for each forest to consider.

Grazing Guidelines

Nesting and brood rearing habitat for each Forest can be reviewed using the USFS Vegetation Monitoring and Assessment Tool. These habitat maps are Preliminary Seasonal Habitat, which means that these habitats were mapped at a very broad scale using lek buffers. These preliminary seasonal habitat maps should be refined/improved with local information in cooperation with local BLM and State Wildlife agency personnel to ensure consistency across agency boundaries and best reflect local knowledge of habitat use by GRSG.

Grazing Guidelines apply in areas that have the ecological capability to achieve the plant heights. Site capability will be determined as follows:

Site Capability/Ecological Site Potential Determination for Meeting Perennial Grass Droop Height Grazing Guidelines in Breeding and Nesting Habitat

When assessing perennial grass height, certain shrub (primarily sagebrush) plant associations may not have the ecological potential to support perennial grasses with a 7-inch droop height in breeding and nesting seasonal habitat by the end of the nesting period. Forest and grassland staff must train field crews on the use of: *Key to Shrubland Community Types of the Intermountain Region v. 2.5* to determine site capability. In general, shrub plant associations that have one of the following as a *second species name* may not be able to support the 7-inch grass height: *Poa secunda, Bouteloua gracilis*, *Pleuraphis (Hilaria) jamesii*, and *Distichlis spicata*.

In order to determine if sites are not capable of producing 7-inch grass heights:

1. Refer to the USFS Vegetation Monitoring and Assessment Tool to identify the mid level existing vegetation map units with plant associations that may not be capable.

2. Intersect the map units with shrub associations that may not have the capability to produce grasses with 7-inch height with Breeding and Nesting Habitat and allotment boundaries to determine the area of interest for sampling.

3. At the plot location, field crews determine if the plot is located in an area that may not have capability to achieve Table 3 Grazing Guidelines, by using the *Key to Shrubland Community Types of the Intermountain Region v. 2.5*, found on the USFS GRSG website.

4. If, after reviewing the *Key to Shrubland Community Types of the Intermountain Region v. 2.5* and vegetation conditions at the site, uncertainty remains regarding capability, install a utilization cage to protect an area from grazing and measure grass height at end of nesting season.

5. When the Key identifies that an area cannot meet the perennial grass droop height criteria, the guidelines require the Forest to "adjust grazing management to move towards desired habitat conditions". This guideline is used to address the desired condition of providing overhead and lateral concealment from predators over 80% of the breeding and nesting habitat (Table 1 of the RODs). Consequently, this determination will require an analysis of how grazing may need to be modified for these sites. This evaluation may include the following questions:

- Is the extent of this type limiting meeting direction to provide overhead and lateral concealment from predators on over 80% of the nesting habitat?
- Is there a level of uncertainty in the determination that needs to be validated by placement of utilization cages over 2 – 3 years of grazing use?
- Is grazing impacting (limiting) providing for overhead and lateral nest concealment?
- If so, what modifications to grazing practices need to be made to meet this desired condition?

This analysis may require additional data collection such as 4th order HAF. It should be conducted by appropriate interdisciplinary (ID) specialists and be started as soon as it is determined that site capability cannot meet the perennial grass droop height requirements. The analysis should be documented at a minimum as an ID report supporting both the determination and the grazing management modifications needed. The analysis and report may lead to term grazing permit modifications and will need to be sufficient to support appeals under 36 CFR 214. If the determination and analysis affects significant portions of the seasonal habitat and associated grazing allotments, it may demonstrate a priority for additional allotment level NEPA analyses and associated decisions.

Grazing Guidelines in Nesting and Breeding Habitat

Grazing guidelines are described in the RODs (Table 3 in the Great Basin ROD, and Table 2 in the NW CO & WY ROD) as:

> When grazing occurs during breeding and nesting season, manage for upland perennial grass droop height of 7 inches, assuming current vegetation composition has the capability to achieve these heights. Heights will be measured at the end of the nesting period.
>
> When grazing occurs post breeding and nesting season manage for 4 inches of upland perennial grass droop height.

1. Intersect the Seasonal Habitat Map finalized in the 3rd Order HAF process with allotments that have grazing occurring within breeding and nesting or brood-rearing

habitat to generate your polygon of interest. See "sample design and plot selection" above.

2. Field Protocol is as follows for each plot:
    a. Navigate to the first sample point location within the allotment and pasture where monitoring is to occur.
    b. Apply the field plot rejection criteria and or plot offset protocol as appropriate (App. B).
    c. Install a single 50-foot transect at a random compass bearing. Even though thetransect is 50-feet long, use a 100-foot tape to ensure an adequate length of tape, per instructions below.
3. Pull tape until taut, and anchor the ends of the transect with a range pins.
    a. Stand on the right side of the tape. The tops of the numbers on the tape should be on the left side of the tape. The first sample point measurement will be at the 5-foot mark (looking out from the beginning of the transect).
    b. At each sample point at 5 foot increments, use a folding ruler to delimit a half-circle subsample. Unfold the ruler 3 times to extend the ruler to a length of 2 feet. Place the folded end of the ruler at the designated foot mark. Pivot the ruler so that it is parallel with (essentially on top of) the tape with the end of the ruler at a distance 2 feet ***lower*** than the designated sample point. For example, at first sample point (the 5' mark), the end of the ruler would touch the 3' mark. Then pivot the ruler clockwise, like a windshield wiper, and when the ruler intersects an individual perennial grass, measure the maximum droop height (which includes the inflorescence if present). As you pivot the ruler, search for grass plants starting at the ruler pivot point (where the ruler intersects the tape) and continue the search along the ruler to the end of the ruler. Keep pivoting clockwise (completing a half-circle) and searching as described above until an individual perennial grass plant (bunchgrass) or plant part (rhizomatous grass) is intersected. **NOTE:** the first grass encountered may occur along the tape. Any part of the plant (base or crown) can intersect the ruler. Only measure one individual grass or grass part per sample point, the <u>first</u> grass plant encountered if there is more than one grass within the half-circle. The droop height is the distance between the maximum aerial extent of the plant (as it is resting in place, leaning or drooping) to the ground. Note that you should measure from the ground surface, NOT the surface of the root crown (this is particularly important with bunchgrasses). Measure maximum droop height of the intersected plant to the nearest inch (rounding up if the value is X.5" inches and rounding down if the value is X.4").
    c. Boundary Rules: With **rhizomatous** grasses, if the perimeter of the grass "plant" (patch) extends beyond the distance of the ruler (is outside the half-circle), only measure the maximum height ***inside*** the half-circle. With **bunchgrasses**, measure

the maximum droop height even if it occurs ***outside*** the half-circle but is clearly part of the bunchgrass that was encountered **inside** the half-circle.

d. Take measurements at 5-foot intervals for a total of 10 measurements per transect. If not all 10 sample locations have grass plants, extend the tape and continue sampling at 5-foot intervals until you have 10 measurements per transect.
e. Do this protocol at a minimum of 5 pre-determined grid sample locations within each pasture. Take the mean of the 10 measurements per transect. This average value is then used to generate an overall mean grass height, when averaged across all 5 transects in the pasture (total of 50 grass heights per pasture).
f. If a plot must be rejected or offset (Appendix B), document reason.

Grazing Guidelines in Brood Rearing and Summer Habitat

Monitoring of grazing guidelines in brood rearing habitat includes measurement of stubble height of mesic meadow vegetation. Several sampling strategies could be used to determine where measurements should take place. Descriptions of three different sampling strategies are provided in this guide; Sample Grid, Key Areas and Nearest Neighbor.

Sample Grid Approach

The intensified sampling grid described in Step 1 (USFS Vegetation Monitoring and Assessment Tool) can be used for evaluating compliance with this guideline, if the Forest is able to identify the mesic meadow polygons and then apply a grid to these areas Refer to Appendix A and B for plot rejection of off-set protocols. After the plot locations have been randomly identified following the Measuring Stubble Height section of this document.

Key Areas Sample Approach

A key area approach may be used to make qualitative inferences about achieving this guideline for herbaceous meadows within seasonal GRSG habitat (Herrick, Van Zee, Havstad, Burkett, & Whitford, 2005, pp. 28-29). Key areas are indicator areas that are able to reflect what is happening on a larger area as a result of on-the-ground management actions. (Coulloudon, et al., 1996, p. 3) A key area should be a representative sample of the herbaceous meadows in the pasture and in the brood-rearing and summer GRSG habitat. Proper selection of key areas requires appropriate stratification. Statistical inference can only be applied to the stratification unit.

Selecting Key Areas. Important factors to consider when selecting key areas representing herbaceous mesic/riparian meadows include the Proper Functioning Condition desired conditions and the 4 in. management grazing use guideline for herbaceous mesic/riparian meadows set in the RODs. Biologists, hydrologists, rangeland management specialists, and the grazing permittees should be involved in selecting these key areas. Note that poor information resulting from improper selection of key areas leads to misguided decisions and improper management.

Prior to selecting Key Areas, the Allotment should be reviewed to determine the location and number of herbaceous/mesic riparian meadows that occur in brood rearing habitat. This may include mapping these areas. The number and size of these meadows should be considered in determine the number of Key Areas necessary to represent the Allotment and or Pasture.

After Key Areas have been selected, the GPS locations of each should be recorded in the Allotment 2210 file.

Criteria for Selecting Key Areas.

- Should be representative of the herbaceous mesic/riparian meadows used by GRSG and livestock use in the brood-rearing and summer habitat in the pasture/allotment.
- Should be capable of, and likely to show, a response to grazing management actions. This response should be indicative of the response that is occurring in grazed herbaceous mesic/riparian meadows used by GRSG in the brood-rearing and summer habitat.
- Should be reflective of livestock grazing activities and not other activities. Key areas should be located where the influence of livestock grazing can be evaluated. Do not locate key areas where other activities such as dispersed recreation, off-road vehicle impacts, use by recreation livestock, etc. limit the ability to relate observations to the grazing activity.

Number of Key Areas. The number of key areas selected to represent seasonal habitat within the pasture/allotment ideally depends on the size of the pasture/allotment and on variability of the types of herbaceous/mesic meadows. However, the number of areas may ultimately be limited by funding and personnel constraints.

Objectives. The primary objectives that will be evaluated at these key areas include the PFC desired conditions (or alternative desired conditions for riparian meadows set in Forest Plans) and desired GRSG forb content set in the RODs. Additional objectives set in Forest Plans or allotment specific decisions may also be included in the selection of these key areas. Monitoring compliance with the 4 in. herbaceous vegetation stubble height will take place in these key areas.

Rangeland management personnel having a good knowledge of grazing distribution and use patterns will need to work with other ID specialists and grazing permittees to locate key areas for monitoring this guideline at the pasture level. While the data collected from the key area monitoring approach cannot be aggregated for a statistical sample beyond the grazing

allotment, “expert knowledge can often be used to make qualitative inferences about other larger areas based on data from subjectively selected plots on key areas. (Herrick, Van Zee, Havstad, Burkett, & Whitford, 2005, p. 104)

Nearest Neighbor Sampling Approach

The following describes a process to identify mesic meadows for sampling using an unbiased approach.

PRE-FIELD:

- 1) Intersect the Seasonal Habitat Map finalized in the 3rd Order HAF process with allotments that have grazing occurring within breeding and nesting or brood-rearing habitat to generate your polygon of interest with the sampling grid points in this polygon. Note that this may extend beyond the HMAs (PHMA, GHMA, IHMA) due to the size of the lek buffer.
    - Review the field plot rejection criteria and or plot offset protocol as appropriate (Appendix B).
- 2) Using Google Earth, resource photography, or other recent NAIP imagery, overlay each sample point location from 1) above to locate the closest riparian/mesic meadow.

IN THE FIELD:

- Field Protocol is as follows for each plot:
    - Navigate to the first accepted upland sample point location within the pasture where monitoring is to occur. Then navigate to the closest riparian area/mesic meadow that was identified in the pre-field step.
    - Review the field plot rejection criteria protocol as appropriate (Appendix B).
    - Also reject the plot if:
        - A minimum long axis of 50 feet is not possible. (Fifty feet is derived based on spacing of plots in MIM[1] - 2.75 m between plots – multiplied by a maximum of 4 cross sections to get a sufficient number of samples at the plot.)
        - It is identified that grazing observations at the site will be influenced by other activities such as recreational horse use, dispersed recreation, etc.
- The following rules are employed, regarding location of the starting point and size of the riparian/mesic community to be sampled.

[1] MIM refers to Multiple Indicator Monitoring of Stream Channels and Streamside Vegetation, BLM Technical Reference 1737-23, 2011. Available at: http://www.blm.gov/nstc/library/pdf/MIM.pdf

- For riparian/mesic areas that are part of a lotic system, the long axis is no greater than 361 feet (same length as MIM 110 meters – however, we are using the English measure system).
- In a lotic system the long axis always goes upstream from the starting point (starting point explained below).
- In a closed lentic basin - or a meadow with at least facultative wetland species but no apparent channel - the long axis is without 'direction' and distance maximum.
- For large riparian/mesic meadows assure that each cross section intersects the long-axis of the mesic/riparian area within 328 feet of sagebrush communites that have >10% cover of sagebrush.
- For small riparian/mesic areas, a minimum long axis of 50 feet is needed. If this is not available, reject the plot.

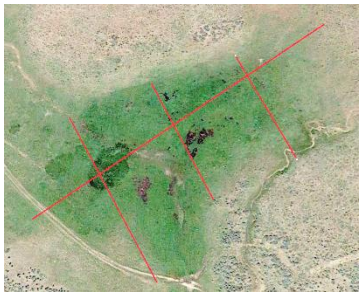
When the directions refer to a starting point, one option for determining how it is found is by: walking from the accepted upland plot to the nearest edge of the accepted riparian/mesic complex, and then walking in a 90 degree line to the long axis. The result is a starting point which is the point where the person walking 90 degrees from the edge intersects what will be the long axis. Temporarily flag the riparian/mesic edge entry if the plot looks like it might be confusing. Then flag the starting point.

Measuring Stubble Height

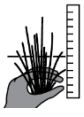
Measuring Stubble Height: Potential vegetation in herbaceous riparian/mesic meadow communities is directly related to ground water availability and duration during the growing season. These communities often vary significantly moving towards drier communities as distance from and depth to soil water sources increase. Wetter communities often are dominated by rushes and sedges. Drier communities are dominated by graminoids such as Kentucky bluegrass, tufted hairgrass and many of the disturbance oriented forbs preferred by sage grouse. Measurement of the 4 in. herbaceous plant height should be done so that it samples the variability of the riparian/mesic meadow community types, i.e. transects that cross the meadow system from wetter to drier meadow communities similar to the organization of cross section sampling identified in the publication, Monitoring the Vegetation Resources in Riparian Areas. (Winward., 2000, p. 8) It is probable that most riparian/mesic meadow communities within GRSG habitat have the capability of producing a 4 in. herbaceous plant stubble height.

Protocol for Measuring Herbaceous Stubble Height in Riparian/Mesic Meadows Key Areas.

1. Select the meadow area which will be used as the key area for monitoring the 4 in. stubble height and document the rationale and process used in its selection in the appropriate 2210 allotment folder, AMP monitoring plan, or the VGS comments field.
    a. Relate observations of use levels of the key area relative to estimates of use levels for other herbaceous mesic/riparian meadows in brood-rearing and summer GSGR habitat that are to be represented by this key area.
    b. Identify participants in the process (specialists and permittees involved).
    c. Must meet requirement to be within 328 feet of sagebrush with at least 10% cover and will be grazed by livestock.
    d. Identify that grazing observations at the site will not be influenced by other activities such as recreation horse use, dispersed recreation, etc.
    e. Locate on maps, by GPS, etc. as appropriate.
    f. Update AMP/monitoring plans as appropriate.
2. A Pace Transect will be used to measure stubble height of graminoids in the key meadow.



    a. Once the key meadow area is selected, the boundaries of the meadow should be identified by the presence of riparian plant communities (obligate, facultative wetland and facultative species.) Measure or pace the length of the meadow in the field and determine the location of cross sections. Two to three cross sections should be used. Locate these by dividing the length of the meadow by 3 or 4 respectively to get the location of each cross section. Place the cross sections at right angles to the length of the meadow. Cross sections could also be established using imagery in the office before going to the key area.
    b. Determine the number of paces for each stubble height measurement for each cross section. These should be spaced sufficiently that measurements are spread across the entire herbaceous vegetation portion of the meadow. A minimum of 30 to 50 sample points should be made in the key area. E.g. if you are using 3 cross sections we would need 10 – 15 samples in each. Pace the length of the cross section and divide the total no. of paces by 10 (or 15) to get the point at which each stubble height measurement will be collected.
    c. Mark or notch the pt. of your boot. At the indicated pace, measure the stubble height (average remaining leaf length) of the nearest perennial graminoid plant. A good way to do this is by forming your hand into an approximate 3-inch diameter circle, grasping the vegetation, and determining the average leaf length to the nearest inch, rounding .5 in. measurements up to the nearest inch.



    d. Record and average the measurements for the key area to determine if the 4 in. grazing guideline is being met.

e. Take photographs showing the length of the meadow complex and at each cross section displaying the level of grazing use that is measured.
f. Whenever possible, compare the measured use level to estimates and observations for other herbaceous meadow areas that the key area is chosen to represent. This will give the resource specialists ability to evaluate how livestock grazing across the pasture/allotment is affecting meadows being used by GRSG.

Grazing Guidelines for Winter Seasonal Habitat

If winter habitat is mapped on allotments, when livestock grazing occurs in the winter habitat regardless of season do not allow more than 35% utilization of sagebrush by livestock. We have not addressed a specific protocol for monitoring the guideline of limiting livestock utilization of sagebrush to less than 35%. The 35% use criteria should be applied to annual leader growth of sagebrush which is available above the snow cover for use by GRSG. Rangeland management personnel and biologists should select a protocol for monitoring livestock grazing to meet this guideline such as is described in the Browse Removal Methods of the Interagency Technical Reference for Utilization Studies and Residual Measurements. (Coulloudon, et al., 1996, pp. 25-50)

Appendix A: US Forest Service GRSG Vegetation Sampling Protocols

Objective: Provide consistent strategies and protocols for collecting vegetation data necessary to implement GRSG LMP amendments. The following are the vegetation sampling needs that will be addressed:

1. Assessment of compliance with the Grazing Guidelines (Table 3 in the Great Basin ROD, and Table 2 in the NW CO & WY ROD) , including
2. Evaluting site capability for application of the Grazing Guidelines.
3. 4th Order Habitat Assessment Framework protocol to assess GRSG habitat conditions for project level NEPA analyses.

Sample Design and Plot Selection

The USFS Vegetation Monitoring and Assessment Tool will provide information necessary to determine plot selection. It is recommended that you review the document: *Using the GRSG Web Application Tool Power Point* at the following location: T:\FS\NFS\R04\Collaboration\GreaterSagegrousePlanningStrategy\GIS\Documentation\Using the GRSG Web Application Tool.pptx

Regions 1, 2, and 4 have developed a systematic grid from which to select plots to use for both grazing and habitat assessment monitoring. The grid is intensified at three levels: 1000 meters, 500 meters, and 250 meters.

When preparing to sample:

1. Use the Regional Sampling Grid to select sampling locations in each polygon of interest:
    a. 1000-m grid will be used for polygons >12,350 acres (247 acres/plot)
    b. 500-m grid will be used for polygons <12,350 and >3,089 (62 acres/plot)
    c. 250-m grid will be used for polygons <3,089 and >772 (15 acres/plot)
2. Use the GRSG Web Application Tool to identify the polygon of interest (often a project area or pasture intersected with seasonal habitat) and to randomly select the desired number of sample locations within the polygon. Select a minimum of 5 plots per polygon.
3. For polygons less than 772 acres in size, use the sample size calculator tool to determine random plot locations of the intensified grid plot locations provided in the USFS Vegetation Monitoring and Assessment Tool.
4. Apply the pre-field plot rejection criteria to refine plot selection; apply the field plot rejection criteria and plot offset criteria as necessary only after navigating to the plot (Appendix B).

Appendix B: Plot Rejection and Adjustment Criteria

Pre-field Rejection Criteria

Reject the plot and select a replacement plot if:

- Tree cover is >=10% at the plot location
- Non-NFS Ownership
- Water (NHD)-Lakes and Reservoir
- Slope >30% in breeding/nesting or> 50% in all other habitat
- Anthropogenic Footprints (Table B-1 below and Great Basin ROD Table 6, page 227)-

Field Rejection Criteria

Use plot adjustment criteria (preferred) or select a replacement plot if (within 100 meters of plot):

- Rocks (lava flow, bed rock, rubble area where top soil has been removed by flood/erosion event, deposition area from flood event, etc.)
- Hazardous Plot (list from FIA: plot cannot be accessed because of a hazard or danger, for example cliffs, quarries, strip mines, illegal substance plantations, high water, etc.) Note: some have suggested that dangerous wildlife be added as an example. AIM uses example with picture of rattlesnake on the site. However, this might be an example of a temporary rejection where the plot could be sampled at some future time
- Denied access area - Access to the entire plot is denied by the legal owner, or by the owner of the only reasonable route to the plot.
- Dispersed and developed campsites. Use standard definition
- Corrals, line cabins/camps, parking areas, or other similar facilities.
- Water bodies (lakes, ponds, rivers, streams)
- Transect aligns closely with area disturbed by fence, trail, road, jeep trail, etc.
- Transect crosses administrative boundary such as allotment or pasture boundary.
- Ownership Change – Non-NFS
- Anthropogenic Footprints (Table B-1 below and Great Basin ROD Table 6, page 227)

Table B-1. *Anthropogenic disturbances documented in the Great Basin RODs (http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3855638.pdf, Table 6, page 227).*

Degradation Type	Subcategory	Data Source	Direct Area of Influence	Area Source
Energy (oil & gas)	Wells	IHS; BLM (AFMSS)	5.0ac (2.0ha)	BLM WO-
	Power Plants	Platts (power plants)	5.0ac (2.0ha)	BLM WO-300
Energy (coal)	Mines	BLM; Forest Service; Office of Surface Mining Reclamation and Enforcement; USGS Mineral Resources Data System	Polygon area (digitized)	Esri/Google Imagery
	Power Plants	Platts (power plants)	Polygon area (digitized)	Esri Imagery
Energy (wind)	Wind Turbines	Federal Aviation Administration	3.0ac (1.2ha)	BLM WO-300
	Power Plants	Platts (power plants)	3.0ac (1.2ha)	BLM WO-
Energy (solar)	Fields/Power Plants	Platts (power plants)	7.3ac (3.0ha)/MW	NREL
Energy (geothermal)	Wells	IHS	3.0ac (1.2ha)	BLM WO-300
	Power Plants	Platts (power plants)	Polygon area (digitized)	Esri Imagery
Mining	Locatable Developments	InfoMine	Polygon area (digitized)	Esri Imagery
Infrastructure (roads)	Surface Streets (Minor Roads)	Esri StreetMap Premium	40.7ft (12.4m)	USGS
	Major Roads	Esri StreetMap Premium	84.0ft (25.6m)	USGS
	Interstate Highways	Esri StreetMap Premium	240.2ft (73.2m)	USGS
Infrastructure (railroads)	Active Lines	Federal Railroad Administration	30.8ft (9.4m)	USGS
Infrastructure (power lines)	1-199kV Lines	Platts (transmission lines)	100ft (30.5m)	BLM WO-300
	200-399 kV Lines	Platts (transmission lines)	150ft (45.7m)	BLM WO-300
	400-699kV Lines	Platts (transmission lines)	200ft (61.0m)	BLM WO-300
	700+kV Lines	Platts (transmission lines)	250ft (76.2m)	BLM WO-
Infrastructure (communication)	Towers	Federal Communications Commission	2.5ac (1.0ha)	BLM WO-300

Plot Adjustment Criteria

If initial plot is rejected, follow this procedure to move the plot and sample the site if possible:

From the original plot center point, move 50 m North (0 degrees). With this location as the center of a new potential plot, evaluate the rejection criteria. If the new plot is not rejected, sample that plot. If it is rejected, move 50 m East (90 degrees) of the original plot center point and evaluate the rejection criteria again. Each time the new plot is rejected, repeat for the remaining cardinal directions--South (180 degrees) then West (270 degrees). If 50 m in all 4 cardinal directions of the original plot center point are rejected, reject the plot. If one of the new locations is accepted as the new plot center, the crew must verify that the new plot location does not fall into any of the other rejection criteria Record the reason for the original rejection, and results of this adjustment procedure in the plot notes.

Appendix C: Helpful Resources and References

Forest Service, BLM and USGS have released a number of publications that focus on the identification and restoration of sagebrush habitats for GRSG across the species' range. It is important to recognize that vegetation restoration efforts in GRSG habitats involve several stages and expertise from multiple disciplines. Restoration efforts should consider the season of GRSG use, the importance of potential treatment areas to the broader population, the prioritization of habitat treatments given the population needs, use of the appropriate restoration tools, the likelihood of a successful restoration given current biophysical conditions, cost/benefits of improvement projects, and a commitment to post-project monitoring. The following publications are a partial list that will help managers identify and utilize methods that have a high likelihood for success.

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