MINIMUM STRUCTURAL VEGETATION COLLECTION GUIDELINES
FOR THE GUNNISON SAGE-GROUSE
Rangewide Steering Committee
March 2007

The following protocol was designed to assess suitability of vegetation conditions for the Gunnison Sage-grouse as outlined in the Gunnison Sage-grouse Rangewide Conservation Plan (RCP) (Appendix H [Gunnison Sage-grouse Structural Habitat Guidelines]).

- This protocol is intended to provide a consistent method for measuring the minimum vegetation characteristics to evaluate site-specific suitability for Gunnison Sage-grouse as described in the RCP Structural Habitat Guidelines (Appendix H). If additional vegetation data is needed, consult the BLM Technical Reference 1734-4 or other agency technical manuals.
- This protocol can be used to evaluate current suitability of site-specific conditions, monitor changes in the suitability of site-conditions over time (other techniques will be needed for specific monitoring projects) and evaluate impacts of habitat and restoration treatments on Gunnison Sage-grouse site-suitability.
- Vegetation data must be collected during the season of use by Gunnison Sage-grouse. For breeding habitat, measurements should start around the middle to the end of May or after the first nests begin to hatch and continue through June to encompass both nesting and early-brood-rearing habitat. Summer habitat measurements should start around mid-June (after the chicks are about 4 weeks old) and continue through mid-August to encompass late-brood-rearing habitat. Winter structural habitat variables (sagebrush canopy cover and sagebrush height) may be collected at any time of the year as these variables do not change substantially on a seasonal basis.
- To ensure repeatability in data collection, all methodology should be established before beginning field work and documented for future reference. To maintain consistency in data collection, use of this protocol is recommended. If an alternate methodology is used to evaluate site suitability with regards to the RCP Structural Habitat Guidelines (Appendix H), techniques must be reported.

General Guidance

- To measure sagebrush and other shrub canopy cover, the line intercept method developed by Canfield (1941) should be used. For other canopy cover estimates use Daubenmire (1959) plots.
- Take a minimum of 1 photo per vegetation transect preferably at the starting point of the transect line. Attempt to take the photo at a height and angle that will provide a good representation of the general condition of the site.
- Frequency, density, and composition are additional types of information that could be collected but are not required by this protocol to assess Gunnison Sage-grouse with regards to the RCP Structural Habitat Guidelines (Appendix H). If this type of data is needed consult the Technical Reference 1734-4 (http://www.blm.gov/nstc/library/pdf/samplveg.pdf).

Specific Measurements

Transect Lines

- Line transects should be 30 m in length.
- Placement of transects should be done using any statistically valid design.
- Collect a UTM coordinate with a GPS unit at the start pointing of the transect line and record on the field form so that transects can be located in the future.
- Transects placement could be stratified by community types and soils.

Shrub Canopy Cover

- Measure all shrubs and trees that intersect the line transect. The sagebrush species (if it can be identified) that intersects the line should be documented; all others non-sagebrush shrubs can be lumped into one category.
- Measure the amount of live shrub canopy cover that intersects the transect line. Large spaces in the foliage cover (>5 cm) should be excluded from the canopy cover measurement so that only live shrub cover is recorded.
- Do not measure overlap of canopy of species—i.e., if two sagebrush plants overlap along the transect, the length of the transect covered from a vertical vantage point is the percent canopy cover regardless of how may individual plants makeup that coverage. Canopy cover should never exceed 100%.

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General Guidelines for Application of Daubenmire (1959)

- See Daubenmire (1959) or USDI-BLM (1996) for additional details
- Five other vegetation variables will be collected along line transects within a Daubenmire frame:
    - Sagebrush Height
    - Grass Height
    - Forb Height
    - Grass Cover
    - Forb Cover
- Collect data in 10 Daubenmire frames along each 30 m transect
- Select a consistent and statistically valid method for placement of the Daubenmire frame along each transect. Record your method on the field form so future transects can be completed in the same way.

Sagebrush Height

- Take one height measurement per sampling point (Daubenmire frame) by selecting the sagebrush closest to the lower left corner of the Daubenmire frame, based on its canopy and not its root. The closest sagebrush could be within the frame, in front of the frame, behind the frame, and on either side of the transect. Choose the sagebrush closest to the lower left corner of the frame regardless of its direction from that corner.
- Note on the data sheet whether the shrub measured is a seedling (no woody base) or a very young plant.
- Exclude seed heads (inflorescences) from height measurement of sagebrush.

- Do not re-measure the same shrub even if it is the closest sagebrush for a subsequent plot. Instead select the next nearest sagebrush within 10 meters of the plot. If there is no other sagebrush within 10 meters, do not take a height measurement for that plot.

Understory Cover

To the extent possible, plants should be identified to the species level, but training and time limitations may prevent this. The important habitat variables to be collected include:

- Grasses: break out perennial versus annual at a minimum. Identify dominant species to the extent possible in comments section of form. Identify cheat grass (e.g. *Bromus tectorum*) and other non-native species to the extent possible.
- Sedges are included in the grass category.
- Forbs: At a minimum list the number of different forb species per plot, even if you cannot identify the species. Identify species to the extent possible.
- Measure the live and residual foliar cover of grasses and forbs.

Understory Height

Height measurements are conducted to characterize the vertical and horizontal structure of the understory. Gunnison Sage-grouse select habitat based on vertical (how tall it is) and horizontal (how thick it is) structure. Both aspects contribute to a diversity of structure and provide a sense of security for birds. These aspects contribute to nest, chick and adult concealment from predation events. That is why these measurements are relatively, but not absolutely consistent.

- Measure 1 grass and 1 forb in each Daubenmire frame. The plants must be rooted in the frame, and if there are no grasses or forbs in the frame, record as not present.
- Measure height of the nearest grass and forb from the bottom left corner of the Daubenmire frame.
- Grass height only includes the current year's growth. There are no criteria or guidelines for previous year's growth (e.g. residual grass height).
- Grass height can include annual or perennial grass. It should be documented on the datasheet if annual grass (cheat grass e.g. *Bromus tectorum*) is measured. It is preferable to measure perennial grasses.
- Additional grass heights can be measured, but at a minimum grass height should be measured in the following manner:
    - Measure grass height (leaf or inflorescence) at the tallest vertical point (do not straighten up the plant, i.e. droop height) where the bulk of a plant's mass occurs. If the inflorescence of the plant does not provide visual obstruction, measure where the bulk of the mass occurs in the leafy portion of the plant at the tallest leaf height (Fig. 1). If the inflorescence provides a bulk of the mass, then the tallest portion of the inflorescence is measured (Fig. 2).
    - This protocol does not provide guidelines for every species of grass. The individual conducting the sampling will have to make a judgment for each

plot and each species along a plot. Consistency by following this protocol is key, as well as collecting an adequate number of measurements.

- The same protocol should be followed for forbs (Fig. 3 - the bulk of the mass of the plant occurs in the leafy portion and the tallest leaf height is measured; Fig. 4 - the inflorescence provides the bulk of the mass the tallest portion of the inflorescence is measured)

All cover estimates should be placed in the categories noted in Table 1. The standard Daubenmire method uses six cover classes, but the specific ranges lump too much in the 5-25% class for Gunnison Sage-grouse vegetation variables. Therefore, this category was split into 2 cover classes below.

Table 1. Cover classes for Gunnison sage-grouse habitat variable estimation.

Cover Class	Range of Coverage	Midpoint of Range
1	0-5%	2.5
2	5-15%	10
3	15-25%	20
4	25-50%	38
5	50-75%	63
6	75-100%	88

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References:

Canfield, R.H. 1941. Application of the line interception method in sampling range vegetation. J. Forestry 39:388-394.

USDI-BLM, Interagency Technical Team. 1996. Sampling vegetation attributes. Technical Reference 1734-4, BLM/RS/ST-96/002+1730, USDI-BLM, National Science and Technology Center, Denver, CO, 172 pp.

Connelly, J.W., K.P. Reese, and M.A. Schroeder. 2003. Monitoring of greater sage-grouse habitats and populations. Station Bulletin 80, University of Idaho, Moscow, USA.

Daubenmire, Rexford. 1959. A Canopy-coverage method of vegetation analysis. Northwest Science 33:43-64.

Examples of where grass and forb heights should be taken.

Figure 1.

Figure 2.

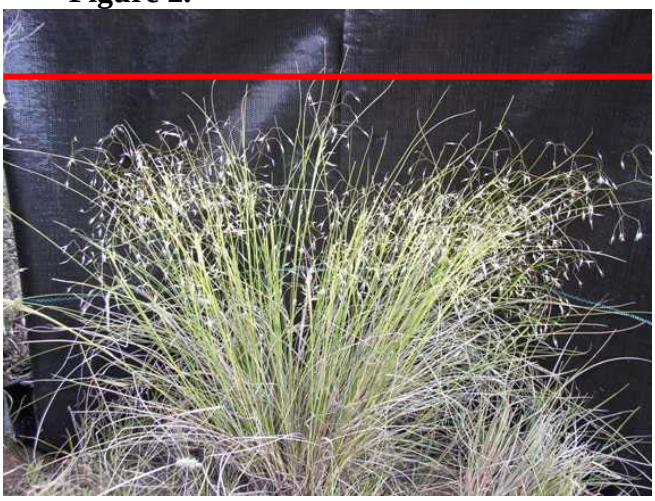

Figure 3.

Figure 4.