

APPENDIX C

SAGE-GROUSE HABITAT MONITORING PROTOCOL

**MINIMUM STRUCTURAL VEGETATION DATA COLLECTION GUIDELINES
FOR SAGE-GROUSE SPECIES IN COLORADO
Gunnison Sage-grouse Rangewide Steering Committee
February 2007**

The following protocol was originally designed to assess suitability of vegetation conditions for the Gunnison sage-grouse as documented in the Gunnison sage-grouse Rangewide Conservation Plan (RCP; Gunnison Sage-grouse Rangewide Steering Committee 2005; “Appendix H, GUSG Structural Habitat Guidelines”). It is applicable to both Gunnison (GuSG and greater sage-grouse (GrSG) in Colorado.

- This protocol is intended to provide guidance in measuring minimum vegetation characteristics to evaluate site-specific structure as described by the “GrSG Structural Habitat Guidelines” (Appendix A in the CCP), and the “Gunnison sage-grouse Structural Habitat Guidelines” (Appendix H of the RCP). If additional vegetation data are needed, consult the BLM Technical Reference 1734-4 or other agency technical manuals.
- This protocol can be used to document current suitability of site-specific conditions, monitor changes in condition over time, and evaluate impacts of habitat and restoration treatments.
- Vegetation data need to be collected during the season of use by sage-grouse. For Breeding Habitat, measurements start around the end of May after the first nest hatches, and continue through June to encompass nesting and early-brood-rearing habitat. Summer Habitat measurements start around mid-June (after the chicks are about 4 weeks old), and continue through mid-August to include late-brood-rearing habitat. Winter structural habitat variables (sagebrush canopy cover and sagebrush height) may be collected at any time of the year because these variables do not change substantially on a seasonal basis.
- To maintain consistency in data collection, use of this protocol is recommended. If an alternate methodology is used, techniques must be reported for future reference.

General Guidance

- To measure sagebrush and other shrub canopy cover, use the line intercept method developed by Canfield (1941). For other canopy cover estimates use Daubenmire (1959) plots.
- Take a minimum of 1 photo per transect 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 these guidelines to assess sage-grouse habitat structural condition. 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 Line Placement

- Line -transects should be 30 m in length and placement of transects should be random within representative range sites.
- Collect UTM coordinates at the start pointing of the transect line, using a GPS unit.
- Transects placement should be stratified by community types and soils.

Shrub Canopy Cover

- Measure all shrubs and trees that intersect the line transect. The species of sagebrush that intersect the line should be documented; all others non-sagebrush shrubs can be lumped into one category.
- Large spaces in the foliage cover (>5 cm) should be excluded from the canopy cover measurement.
- 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 many individual plants makeup that coverage. Canopy cover should never exceed 100%.

General Guidelines for Application of Daubenmire (1959)

- See Daubenmire (1959) or Bureau of Land Management (1996) for additional details
- Note: cover classes indicated for Daubenmire (1959) have been modified per discussion regarding Table C-1
- 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 systematic method for placement of the Daubenmire frame along each transect. Record the method used 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
- 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 that 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: at a minimum, distinguish between perennials and annuals. Identify dominant species to the extent possible in comments section of form. Identify cheat grass 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. 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 consistent, 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 years' growth (e.g., residual grass height).
- Grass height can include annual or perennial grass. If annual grass (e.g. *Bromus tectorum*) is measured, it should be documented on the datasheet. 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 plant has only 1 inflorescence and the bulk of the mass occurs in the leafy portion of the plant, measure the tallest leaf height. If the inflorescence provides a bulk of the mass, then the tallest portion of the inflorescence is measured.
 - 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.

All cover estimates should be placed in the categories noted in Table C-1. The standard Daubenmire method uses 6 cover classes, but the specific ranges lump too much in the 5-25% class to detect understory habitat conditions when compared to the Gunnison or greater sage-grouse vegetation variables, this category was split into 2 cover classes below.

Table C-1. Modified cover classes for 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

Examples of where grass and forb heights should be taken (ignore horizontal blue line in photos).

