

Vegetation Monitoring Procedure for the Southern Plains Grassland Protocol

Standard Operating Procedure (SOP) #15: Canopy Closure

Version 1.1 (August 2025)

Revision History Log:

Previous Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #
1.0	08/06/2025	M. Owen	Changed orientation of measurements.	Ease and consistency of measurement.	1.1

This Standard Operating Procedure gives step-by-step instructions for sampling overstory canopy closure with a spherical concave densiometer. Canopy closure is the proportion of the sky obscured by vegetation when viewed from a single point. It is measured at three locations along the 50-m transect. Canopy measurements should not occur until the crew has set up and photographed the transect line and completed the Line-Point Intercept procedure (see SOP #6). Procedures are done in this order to avoid trampling vegetation along the transect before it is monitored.

Preparation for Data Collection

1. If using paper data sheets, be sure to record the park, plot name, date, and recorder/observer at the top of all pages.
2. If using a field laptop, confirm that the Grasslands Database is open to the appropriate plot. Open the densiometer tab.

Data Collection

1. Canopy closure measurements are collected at the 10-m, 25-m, and 40-m marks on the transect line.
2. Hold the densiometer 12” in front of you, at elbow height, with your elbows steadied against your torso. Level the densiometer using the bubble level. Position your body so that your forehead is visible at the top of the mirror as you make the reading (Figure 1). Count the number of point intersections covered by live or dead vegetation above the V (maximum is 17).
3. Four measurements are made in the following four directions: facing 0P, facing 50P, perpendicular to the transect facing left (left when looking from transect origin to end point), and perpendicular to the transect facing right. Keep the densiometer in the same place as you rotate it and yourself for each reading.

4. Record the location along the transect and each of the four measurements into the database or a paper data sheet (Figure 2). If using paper data sheets, the data will either need to be entered into the database while at the plot or at the end of the same day. If entered after leaving the plot, a second technician must perform a 100% check (meaning that 100% of the entered data must be double-checked). Do not discard paper data sheets—they will need to be scanned (see SOP #13, Daily Data Management).

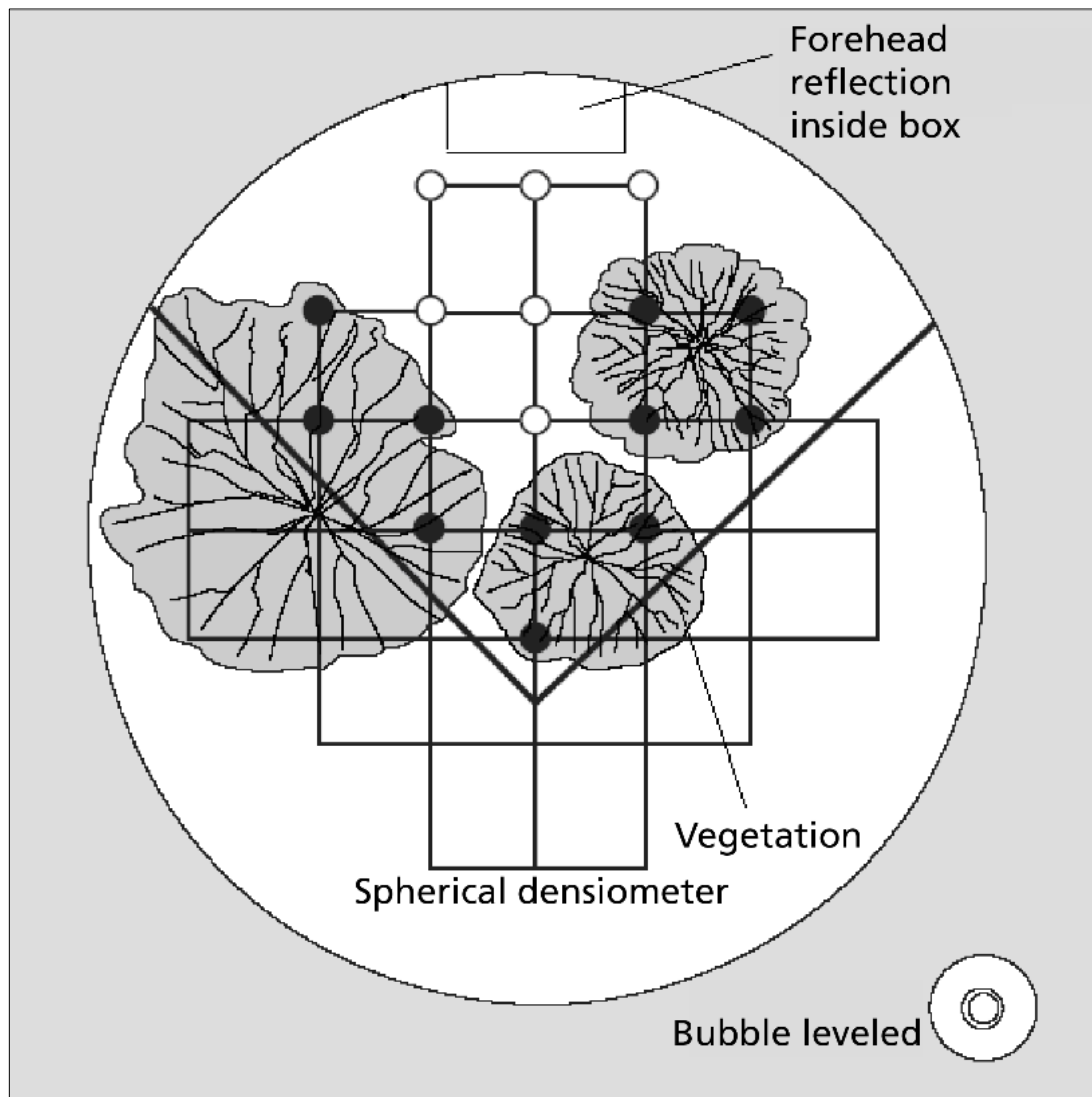


Figure 1. An illustration of a modified, concave spherical densiometer, depicting the gridded mirror in which the overhead canopy and observer's forehead are reflected. Also note the bubble level. Data are recorded for the 17 points of intersection within the two diagonal lines. Closed circles represent intersections where vegetation is present and consequently counted in the measurement of canopy closure. Canopy reflected in the area within the diagonal lines is not duplicated in subsequent directional readings. Figure source: Fitzpatrick, F.A., I.R. Waite, P.J. D'Arconte, M.R. Meador, M.A. Maupin, and M.E. Gurtz. 1998. Revised methods for characterizing stream habitat in the National Water-Quality Assessment Program: U.S. Geological Survey Open-File Report 98-4052.

The screenshot shows the 'Densimeter' tab in a data entry form. It contains three tables for recording measurements at different distances from a transect line. Each table has columns for 'Tape (m)', 'Direction', 'Reading', and 'Notes', with a 'Delete' button next to each row.

Tape (m)	Direction	Reading	Notes	Delete
10	Right	15		Delete
10	OP	9		Delete
10	Left	13		Delete
10	50P	13		Delete

Tape (m)	Direction	Reading	Notes	Delete
25	50P	0		Delete
25	OP	0		Delete
25	Left	0		Delete
25	Right	0		Delete

Tape (m)	Direction	Reading	Notes	Delete
40	Right	17		Delete
40	OP	15		Delete
40	50P	16		Delete
40	Left	17		Delete

Each table includes a footer with navigation controls: 'Record: 1 of 4', 'No Filter', and a 'Search' button.

Figure 2. Densimeter Tab in the Data Entry Form, showing the three preset measurement locations (10, 25 and 40 m) and the four measurement directions (facing OP, facing 50P, and perpendicular to the transect, facing left and facing right). NPS figure

QA/QC and Database Backup

Once data collection is finished, the crew lead (or lead technician) is responsible for ensuring that all QA/QC checks are completed, and, if using the database, that a pdf of the field data (field data sheet) is printed and a backup of the database is made before leaving the plot.

1. Confirm that four measurements were made at each location on the transect line.
2. If using the database, print a field data sheet and save the file to the appropriate park folder. For example, LAMR field data sheets will be saved to the C:\Grasslands\Data\Raw_Datasheets\LAMR folder. Use the following nomenclature: "PARKlast 2 digits of year + Transect name + Date printed". If edits are made to the plot data later in the day, a new field data sheet must be printed. Do not overwrite previous data sheets; add a lowercase letter to the end of the file name.
3. Exit the database and save a backup. File path for backups: C:\Grasslands\Data\Backups; then save into the appropriate park folder.