Line-point intercept

Line-point intercept is a rapid, accurate method for quantifying soil cover, including vegetation, litter, rocks and biotic crusts. These measurements are related to wind and water erosion, water infiltration and the ability of the site to resist and recover from degradation. For a detailed discussion of this and other methods for measuring plant cover and/or composition, see Elzinga et al. 2001[2]. For alternative Line-point intercept methods (including height measurements) see Volume II.

Materials

- **Measuring tape (length of transect)—if using a tape measure in feet, use one marked in tenths of feet.**
- **Two steel pins for anchoring tape**
- **One pointer—a straight piece of wire or rod, such as a long pin flag, at least 75 cm (2.5 ft) long and less than 1 mm (1/25 in) in diameter**
- **Clipboard, Line-Point Intercept Data Form (page 12) and pencil(s)**

Standard methods (rule set)

1. **Pull out the tape and anchor each end with a steel pin (Fig. 6).**

Rules

1.1 Line should be taut.

1.2 Line should be as close to the ground as possible (thread under shrubs using a steel pin as a needle).

2. **Begin at the "0" end of the line.**
3. **Working from left to right, move to the first point on the line. Always stand on the same side of the line.**
4. **Drop a pin flag to the ground from a standard height (__ cm (__in)) next to the tape (Fig. 7).**

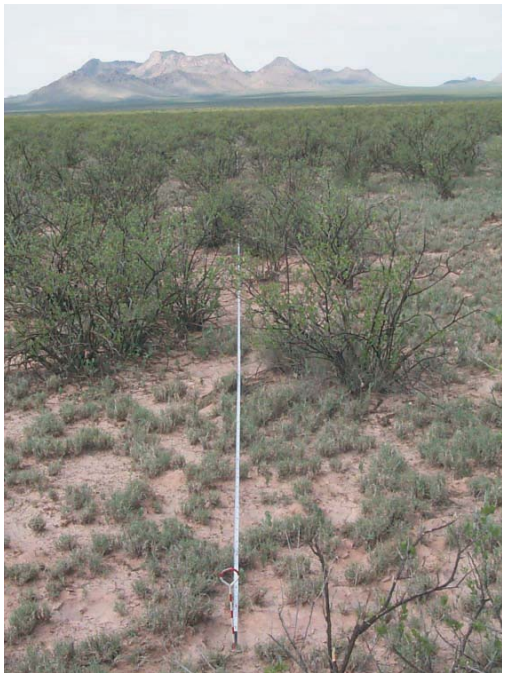


Figure 6. Transect line pulled taut.

Rules

4.1 The pin should be vertical.

4.2 The pin should be dropped from the same height each time. A low drop height minimizes "bounces" off of vegetation but increases the possibility for bias.

4.3 Do not guide the pin all the way to the ground. It is more important for the pin to fall freely to the ground than to fall precisely on the mark.

4.4 A pair of lasers with a bubble level can be used instead of the pin. This tool is useful in savannas where plant layers may be above eye level. See Appendix A (Monitoring tools) in Volume II for suppliers.

Step-point or pace transect with pin (Semiquantitative alternative)

Use a pin flag dropped in front of your boot instead of the points on the tape. Record first hit or all hits, as for standard method. This method is less accurate because it is difficult to walk a straight line, especially through shrubs. Using the toe of a boot instead of a pin creates additional errors because the boot often pushes plant canopies into interspaces. This leads to overestimates of foliar cover.

[2]Elzinga, C.L., D.W. Salzer, J.W. Willoughby and J.P. Gibbs. 2001. *Monitoring Plant and Animal Populations*, Blackwell Publishing. 368 pp.

5. Once the pin flag is flush with the ground, record every plant species it intercepts.

Rules

5.1 Record the species of the first stem, leaf or plant base intercepted in the "Top layer" column using the PLANTS database species code (http://plants.usda.gov/), a four-letter code based on the first two letters of the genus and species, or the common name.

5.2 If no leaf, stem or plant base is intercepted, record "NONE" in the "Top layer" column.

5.3 Record all additional species intercepted by the pin.

5.4 Record herbaceous litter as "L," if present. Litter is defined as detached dead stems and leaves that are part of a layer that comes in contact with the ground. Record "WL" for detached woody litter that is greater than 5 mm (or ~1/4 in) in diameter and in direct contact with soil.

5.5 Record each plant species only once, even if it is intercepted several times.

5.6 If you can identify the genus, but not the species either use the PLANTS database genus code (http://plants.usda.gov) or record a number for each new species of that genus. ALWAYS define the genus portion of the code and the functional group at the bottom of the data form (*Artemisia* species = AR01).

5.7 If you *cannot* identify the genus, use the following codes:

AF# = Annual forb (also includes biennials)
PF# = Perennial forb
AG# = Annual graminoid
PG# = Perennial graminoid
SH# = Shrub
TR# = Tree

If necessary, collect a sample of the unknown off the transect for later identification.

5.8 Foliage can be live or dead but only record each species once. If both live and dead canopy for the same species is hit on the same point, record the live canopy. Be sure to record all species intercepted.

Figure 7. Point falling on bare soil (NONE/S).

6. Record whether the pin flag intercepts a plant base (Fig. 8) or one of the following in the "Soil surface" column.

R = Rock (> 5 mm or ~1/4 inch in diameter)
BR = Bedrock
EL = Embedded litter
D = Duff
M = Moss
LC = Visible biotic crust on soil
S = Soil that is visibly unprotected by any of the above

Rules

6.1 For unidentified plant bases, use the codes listed under 5.7.

6.2 Record embedded litter as "EL" where removal of the litter would leave an indentation in the soil surface or would disturb the soil surface. Record duff as "D" where there is no clear boundary between litter and soil and litter is not removed during typical storms (occurring annually).

6.3 Additional categories may be added, such as "CYN" = dark cyanobacterial crust.

Recording dead vs. live:
Distinguishing dead vs. live plants or plant parts is important for many objectives. Points where only dead plants or plant parts are intercepted can be recorded by either circling the species on the paper data form, or by using the optional checkbox in the Access database form (http://usda-ars.nmsu.edu/monit_assess/monitoring.php). Be sure to note whether a check means that the plant part (recommended) or entire plant is dead, and remember that many desert plants only appear to be dead.

Table 2. Sample data form for examples illustrated below. Points 1 and 2 show the first two points on a line. In Point 1, the pin flag is touching dead fescue, live bluegrass, clover, live fescue, litter and a rock. Record fescue only once, even though it intercepts the pin twice. In Point 2, the flag touches fescue, then touches litter and finally the fescue plant base. Table 2 shows how to record these two points on the data form.

Pt.	Top layer	Lower layers			Soil surface
		Code 1	Code 2	Code 3	
1	Fescue	Bluegrass	Clover	L	R
2	Fescue	L			Fescue
3	Fescue	L			S
etc.					

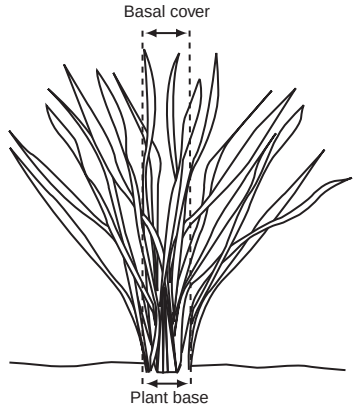
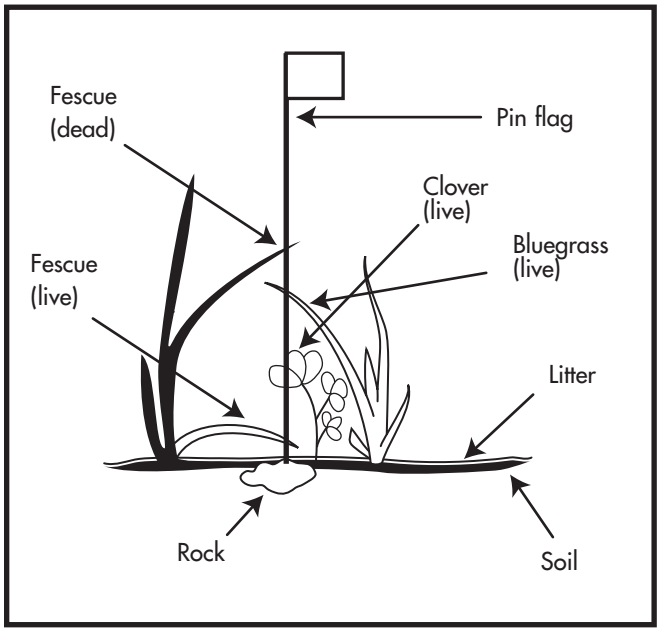
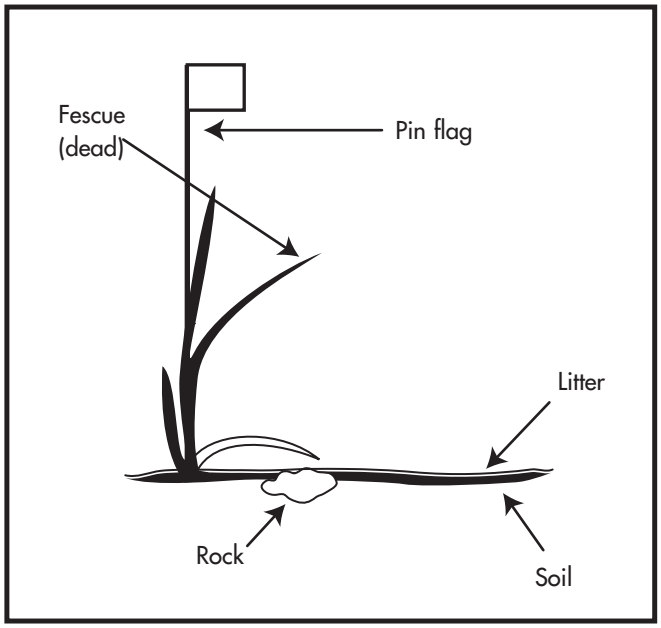


Figure 8. Area defined as plant base and included as basal cover.



Point 1



Point 2

Riparian note: Line-point intercept collected perpendicular to the channel is often used to monitor riparian zone width. A modified point intercept method is used to monitor "greenline" vegetation along the channel's edge (Vol. II, Chapter 13).