

Watershed Protection on Sagebrush Steppe: Characteristics and Importance of Litter Cover

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Ground cover has typically been defined as the area of ground covered by vegetation and litter. Litter has been defined by some authorities as dead organic matter lying on the mineral soil; others have included standing dead material and dead fallen organic material. On the basis of these definitions, litter in sagebrush steppe ecosystems includes fallen dead leaves, stems, bark, flowers, and seeds of shrubs, forbs, and grasses; dead cushion plants and moss; detached lichen; animal feces and dead insects; and unidentifiable amorphous woody organic matter (humic litter) lying on the mineral soil surface.

Litter seems to be the most prevalent ground cover component in sagebrush steppe ecosystems. Researchers have collected long-term data on vegetation and ground cover

characteristics in high-elevation sagebrush steppe in south-central Wyoming. According to these data, litter was consistently the largest ground cover component, averaging 46% over a 14-year measurement period. Data from sagebrush steppe plant communities in North Park, Colorado, also showed litter to be the largest component (>30% of ground cover).

Litter provides a source of organic matter for incorporation into the underlying mineral soil, acts as a source of carbon for organisms carrying out decomposing functions, and insulates the soil from extreme air temperatures. Litter also plays a critical role in watershed protection by promoting water infiltration and protecting the soil from the erosive energy of raindrops and surface runoff.

Although ground cover requirements have been established for many rangeland areas in the West, scientific information about litter characteristics and the role of litter in watershed protection is not readily available. The hydrologic and geomorphic properties of litter have received little attention. I could not find any published information about

the disposition of litter in burned, shrub-steppe plant communities. Others have concluded that we have no clear concept of what constitutes aboveground litter in arid and semiarid ecosystems.

From the standpoint of watershed protection, litter is definitely good—the more the better. But what kinds of litter provide the best watershed protection? What types of litter occur in sagebrush steppe? Observations from high-elevation sagebrush steppe in southern Wyoming suggest the following litter classification:

- Herbaceous (stems and leaves of grasses and sedges)
- Humic litter (amorphous, small, partly decomposed organic matter)
- Animal feces and dead insects
- Woody parts of sagebrush and other shrubs
- Shrub and forb leaves
- Seeds and flower parts
- Dead parts of cushion plants (including mosses, detached lichens, cryptogams)

The preceding classification is a reflection of the parent material, or source, of the litter. Litter might also be



classified on the basis of age and decay. One researcher concluded that soil erosion was greater on sites with small, easily detached litter than on sites having large, firmly anchored litter. Some researchers differentiated between easily decomposed labile litter, such as leaf and flower parts, and highly persistent litter with a high

lignin content, such as wood. Persistent litter probably has more watershed protection value than the easily oxidized, high-cellulose litter derived from herbaceous vegetation. The Table shows the percentage of occurrence and watershed protection value of various types of litter in sagebrush steppe.

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Table. Litter types, percentage of occurrence, and the watershed protection value for sagebrush steppe rangeland.

Litter type	Occurrence (%)	Watershed protection value
Herbaceous	45	Moderate
Shrub and forb leaves	19	Moderate
Humic material	15	Low
Woody parts of shrubs	11	High
Dead cushion plants	6	High
Seeds and flowers	3	Low
Animal feces	1	Moderate

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