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SPATIAL RELATIONSHIPS AMONG YOUNG *CERCOCARPUS LEDIFOLIUS* (CURLLEAF MOUNTAIN MAHOGANY)

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ABSTRACT.—This study analyzed spatial location patterns of *Cercocarpus ledifolius* Nutt. (curlleaf mountain mahogany) plants, classified as current-year seedling, established seedling, juvenile, and immature individuals, at a central Nevada study site. Most current-year seedlings were located in mahogany stands in which large, mature individuals had the greatest abundance. These stands had greater litter cover and a thicker layer of litter than areas with few current-year seedlings. Most established young *Cercocarpus* were located in adjacent *Artemisia tridentata* ssp. *vaseyana* (mountain big sagebrush) communities, or in infrequent canopy gaps between relatively few large, mature *Cercocarpus*. We discuss potential roles of plant litter, root growth characteristics, nurse plants, and herbivory in the establishment and renewal of *Cercocarpus* communities.

Key words: Cercocarpus, *litter, mountain mahogany, seedling, recruitment, spatial relationships, maturity class.*

Cercocarpus ledifolius Nutt. (curlleaf mountain mahogany; hereafter *Cercocarpus*) is a desirable browse species in the Intermountain West (Smith 1950, Smith and Hubbard 1954, Hoskins and Dalke 1955). Attempts to revegetate wildlife habitat with *Cercocarpus* have had little success. Common problems have been competition from annual weeds (Holmgren 1954), sensitivity to frost and drought (Plummer et al. 1957, 1968), slow growth (Plummer et al. 1957), and impaired germination (Liacos and Nord 1961, Young et al. 1978).

Cercocarpus does not sprout from root crowns following removal of the canopy (Ormiston 1978, Austin and Urness 1980). Reproduction must occur from seed. Limited research has addressed the structure of *Cercocarpus* stands (Scheldt 1969, Duncan 1975, Davis 1976, Davis and Brotherson 1991) or how stand structure may influence regeneration. Except for Duncan's (1975) work in Montana, past studies concluded that most stands have few young *Cercocarpus* and that older individuals have the greatest abundance. These studies (Scheldt 1969, Duncan 1975, Davis 1976, Davis and Brotherson 1991) also found few seedlings, low seedling survival, and irregular seed production (Plummer et al. 1968). The few current-year *Cercocarpus* seedlings that emerge apparently have rapid elongation of their taproot (0.97 m after 120 days; Dealy 1975). Rapid root growth should benefit *Cercocarpus* seedlings in the Great Basin, where a semiarid climate predominates. Previous studies indicate land managers require additional information about 2 processes in *Cercocarpus* communities: (1) the dynamics of current-year *Cercocarpus* seedlings in relationship to the rest of the vegetative community, and (2) conditions that permit current-year seedlings and established young *Cercocarpus* to be recruited into the population structure.

Schultz et al. (1991) presented the first predictive relationships about the structure of *Cercocarpus* stands. Their study in western and central Nevada found that mean *Cercocarpus* crown volume had a significant ($P \leq 0.05$) inverse relationship ($r^2 = 0.78$) with density of *Cercocarpus* in established seedling, juvenile, and immature maturity classes. Schultz (1987) also found that *Cercocarpus* canopy cover and mean *Cercocarpus* crown volume had significant ($P \leq 0.05$) positive correlations with density of current-year *Cercocarpus* seedlings. This dichotomy, along with other patterns observed by Schultz (1987), may offer valuable insight into the regeneration of *Cercocarpus* stands. Additionally, Schultz (1987) observed that (1) locations with large canopy gaps between widely scattered mature individuals generally had more *Cercocarpus* in established seedling, juvenile, and immature maturity classes than

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