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## **STAGES OF HABITAT STRUCTURAL TREND THAT ARE RELATED TO UNGULATE BROWSING**

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To maintain their structural identity, communities of tall-growing trees and shrubs depend on the growth of young plants to replace mature individuals that die. Ungulate browsing influences that structure by permitting or preventing the height growth of young plants. The resulting changes in structure are indicated by the browsing-related architectures of plants that grow within the browse zone, i.e., those  $\leq 2.5$  m tall. Using examples from six National Wildlife Refuges, we describe six stages of structural trend and their

management implications: 1) Structure is Stable, i.e., all plants have Uninterrupted-growth-type architecture; 2) Early Stage of Structural Decline most or all plants have Arrested- or Retrogressed-type architecture and there is no visible evidence of dieback; 3) Intermediate Stage of Structural Decline, i.e., all plants have Arrested- or Retrogressed-type architecture, dieback is apparent, and live stems extend throughout the lower half of the browse zone; 4) Advanced Stage of Decline, i.e., all plants have Arrested- or Retrogressed-type architecture and live stems are restricted to the lowest part of the browse zone; 5) Structure is Lost, i.e., no live plants; and 6) Recovery of Structural Diversity, i.e., there is evidence that the Early, Intermediate, or Advanced Stage of Decline existed, and that young Uninterrupted-growth type plants are growing into the browse zone. Three factors influence the rate-of-change from one stage to another: Susceptibility, Resistance, and Resilience. Because the stages are independent of species composition, they provide a means of comparing the effect of browsing in diverse habitats across a region.