

142.4 Montane Meadow Grassland

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Montane meadow grasslands are contained largely within the Rocky Mountain, Sierran, and Madrean montane conifer forests. They are not shown on the color map (Brown and Lowe, 1980). These natural openings or parks are generally restricted to flatlands possessing heavy, poorly drained muck soils. Such soils are unsuitable for tree growth, and the forest edge is frequently abrupt, producing a marked "edge effect."

Herbs, forbs, and "weeds" usually outnumber the grasses (Fig. 59). These "flower meadows" of lower elevations are distinct from the higher and sometimes adjacent subalpine grasslands, which in the Southwest are usually above 2,600 m elevation and are commonly dominated by bunchgrasses. Also not to be confused with montane meadow grasslands are extensions of plains grassland into the lower Ponderosa Pine forest on plateaus and mesas between 1,800-2,500 m.

While often not extensive, these attractive landscapes are nonetheless important to the meadow-affiliated animals of the montane conifer forest. These include, in appropriate geographic areas of the Southwest, Elk (*Cervus elaphus*), deer (*Odocoileus hemionus*, *O. virginianus*), Pocket Gopher (*Thomomys bottae*), meadow voles (*Microtus mexicanus*, *M. californicus*), Wild Turkey (*Meleagris gallopavo*), the Western Bluebird (*Sialia mexicana*), and the Western Flycatcher (*Empidonax difficilis*). The larger meadow areas may also serve as more or less seasonal habitats for such grassland species as the Pronghorn (*Antilocapra americana*), the American Kestrel (*Falco sparverius*) and other raptors, and the meadowlarks (*Sturnella magna* and *S. neglecta*).

Where a small stream courses through meadow, *Thamnophis elegans* and *Rana pipiens* are usually present and often abundant. Wet meadows that are without stream development, but with a small pond at the lower end, often support populations of *Ambystoma tigrinum* and Chorus Frogs (*Pseudacris triseriata*) as do the subalpine mountain meadows. This is the mountain home of the bright green Arizona Treefrog (*Hyla eximia*) that breeds in water as do the others, but unlike Leopard and Chorus Frogs, lives in the shrubs and trees bordering the montane meadow ponds and streams—where it hides by day and hunts its insect food at night. Thus the amphibian species in montane meadow grasslands are usually found in the lower wetland portions of the meadows where sedges (*Carex*, *Cyperus*), spike rushes (*Eleocharis*) and rushes (*Juncus*) occur.

Where not heavily grazed, an enormous variety of summer flowering perennial forbs and grasses may be present. These may include some introductions such as Black-eyed Susan (*Rudbeckia hirta*), Mullein (*Verbascum thapsus*), and Kentucky Bluegrass (*Poa pratensis*). Surprisingly many of the same characteristic meadow species are present in montane habitats in the Californias, in the Rocky Mountains, and in the Sierra Madres, and many montane meadow species are conspecific between two or more biotic provinces. These include Bracken Fern (*Pteridium aquilinum*), Corn-lily (*Veratrum californicum*), Monkey Flower (*Mimulus nasutus*), Mountain Brome (*Bromus marginatus*), and Mountain Muhly (*Muhlenbergia montana*). Another shared species is Iris (*Iris missouriensis*) which may dominate completely in heavily grazed meadows. Other common species are regionally restricted as is to be expected within biotic provinces—for example *Blepharoneuron tricholepis* which occurs only in the Rockies.



Figure 59. Montane meadow grassland of herbaceous forbs within Rocky Mountain montane conifer forest in the Apache-Sitgreaves National Forest, Arizona, ca. 2,590 m elevation. Midsummer aspect. The trees are Douglas-fir (*Pseudotsuga menziesii*) and White Fir (*Abies concolor*) at this site near the upper elevation limit for temperate montane biomes. Photograph by John N. Theobald.

Other characteristic plants in montane meadows include a large number of usually showy herbs in the genera *Lupinus*, *Lathyrus*, *Helianthus*, *Aster*, *Penstemon*, *Senecio*, *Solidago*, *Lotus*, *Astragalus*, *Vicia*, *Sphaeralcea*, *Viola*, and many others.

Because of their initial abundant herbage, meadow grasslands were and still are centers for livestock operations that

often subject the meadow to unduly heavy grazing pressures. Such overgrazing commonly results in changes in plant composition from grass and forbs to perennial scrub (*Artemisia*, *Chrysothamnus*, *Senecio*, etc.). If drying, trampling, and erosion of the deeper soils continue, the meadows themselves may eventually be replaced by forest.