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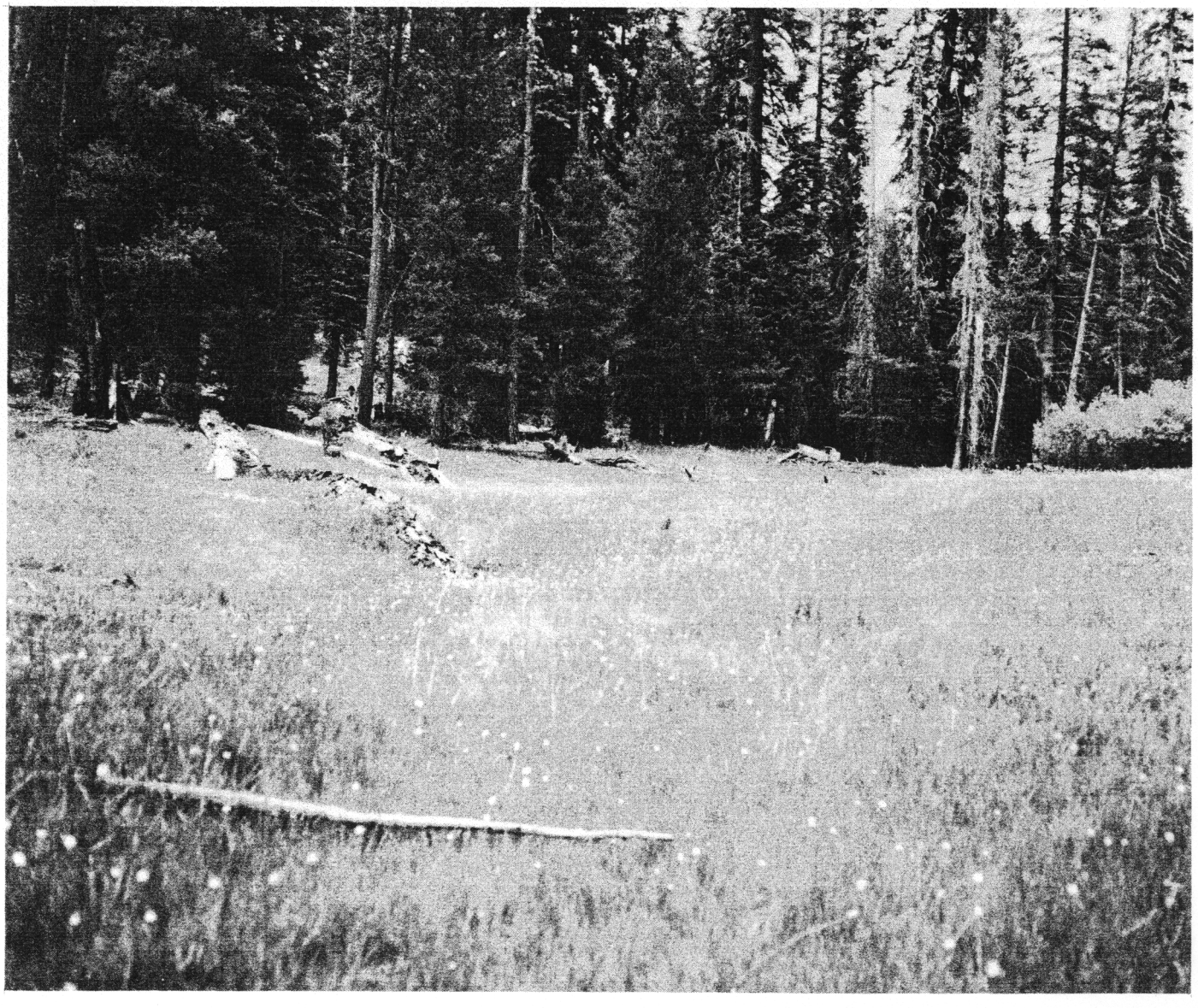
A Meadow Site Classification for the Sierra Nevada, California

Raymond D. Ratliff



Meadows are the most biologically active of the plant community types of the Sierra Nevada, California, and serve many purposes. They contribute a high proportion of the forage produced on many forest grazing allotments, park preserves, and wilderness areas. They supply habitats for wildlife populations. By providing scenic vistas, the meadows' timbered edges are favored campsites of forest, park, and wilderness visitors. The meadows also help to filter sediments from water of surrounding slopes, thereby assuring clean streams and lakes. Because of these multipurposes, land managers face a special challenge to maintain, restore, and manage all meadows.

Meadows comprise less than 10 percent of the Sierra Nevada, and they are generally smaller than those of other mountain ranges (Smiley 1921). Because of these features, meadow (as commonly used in the area) includes open grasslands, marshes, bogs, and meadows as usually defined (California Region 1969, Range Term Glossary Committee 1974).

A meadow site is an area of homogeneous species composition, having a general species composition visually different from that of adjacent areas (Ratliff 1979). Although vegetation is a continuum, when a site is delimited, it occupies space. The space is limited, and no two meadow sites are exactly alike. Meadow sites are discrete entities and each site has characteristics peculiar to it. Meadow sites, therefore, are individual units to be classified.

Classification of meadow sites of the Sierra Nevada and of other mountain ranges have been attempted over the years. But a better classification system than now exists for mountain meadows is needed. To assist land managers, applicable cultural treatments—reseeding, weed control, gully stabilization, and grazing management—need to be developed for the *varying kinds of meadow sites* rather than for meadows in general. Standards for the healthy condition of the vegetation, for trends to potential or stable-state vegetation, and for grazing need to be more flexible to deal with variation between or within meadows. Requirements of most meadow plant species for growth and development, and for reproduction are either poorly known or known only generally. Interspecific relationships of meadow species are little understood. A classification system with classes, class descriptions, key, and classification functions can provide managers with a means for clearer communication of knowledge about meadows, a basis for grouping similar sites, and an opportunity for developing technical classifications, such as meadow fragility and condition. Class descriptions give some ideas of potential vegetations, and new sites can be placed into the classifications.

Meadows of the Sierra Nevada have been classified in various ways. Wet and dry or semiwet meadow range sites are recognized and classified by range type (California Region 1969). The range-type designation indicates the vegetation type and the dominant species. A single classification is usually applied to an entire meadow area with little, if any, recognition given to different sites.

Meadows are classed as midaltitudinal or montane and high altitudinal or subalpine and alpine (Sharsmith 1959). Kings Canyon National Park meadows are classified into wet, woodland, and shorthair (*Calamagrostis breweri*) types (Sumner 1941). The wet meadow type is broken into sphagnum, coarse-leaved sedge, fine-leaved sedge, and grass subtypes, and division of the woodland meadows into broad-leaved and coniferous subtypes is suggested (Bennett 1965). Three classes—level meadows, hanging meadows, and stringer meadows—are used along Rock Creek in Sequoia National Park (Harkin and Schultz 1967). Meadows of Gaylor Lake Basin in Yosemite National Park are classed as wet, moist, and dry (Klikoff 1965). The wet type is the shorthair type of Sumner (1941), and the dry type corresponds to the short-hair sedge (*Carex exserta*) type described by Bennett (1965).

Four kinds of meadow soils on the Sierra National Forest are described by the U.S. Department of Agriculture, Soil Conservation Service (1962). They are normal meadow, drained meadow, alluvial timber, and peat meadow soils. All have effective depths of 3 to 5 feet.

Meadows outside the Sierra Nevada have been classified in various ways. A hydric series of developmental stages leads to climax forest in the Black Hills of South Dakota (Hayward 1928). Streamside meadow communities of the Wasatch Plateau can be separated into types on the basis of dominant species (Ellison 1954). Northeastern California meadows are classed as well-drained, open-basin; poorly drained, closed-basin; or moderately drained, closed-basin (Hormay 1943). Three kinds of meadow or marsh associated with "fen peat" are separated from sphagnum bog and aquatic stands on the presence or absence of *Carex rostrata* (beaked sedge) (Dirschl and Coupland 1972). Eight subalpine meadow community types are described for the Olympic Mountains of Washington (Kuramoto and Bliss 1970). Six Rocky Mountain National Park, Colorado, meadow types are defined and divided into montane and subalpine successional sequences (Wilson 1969). Dry, moist, subalpine or alpine moist-to-wet, tule, and wet meadows are the five subformations of the meadow formation (Hall 1979). Within the subformations are 28 series that can be divided into associations—groups of sites having closely similar vegetation. Sedge (*Carex*) and wiregrass (*Juncus*) series are included in the graminoid subformation of the herbaceous formation in southern California (Paysen and others 1980).

Some of the meadow sites in some other areas are similar to those found in the Sierra Nevada. The pond stage of Hayward (1928) and the rostrata sedge marsh and spike-

Southwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture; 1980. 33 p.

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Ratliff, Raymond D. **A meadow site classification for the Sierra Nevada, California.** Gen. Tech. Rep. PSW-60. Berkeley, CA: Pacific Southwest Forest and Range Experiment Station, Forest Service, U.S. Department of Agriculture; 1982. 16 p.

This report describes 14 meadow site classes derived through techniques of agglomerative cluster analysis. The class names are: *Carex rostrata* (beaked sedge), *Poa* (Kentucky bluegrass), *Heleocharis/Heleocharis* (ephemeral-lake), *Hypericum/Polygonum/Viola* (hillside bog), *Trifolium/Muhlenbergia* (longstalk clover), *Deschampsia/Aster* (tufted hairgrass), *Carex nebrascensis* (Nebraska sedge), *Heleocharis/Muhlenbergia* (fewflowered spikerush), *Muhlenbergia/Heleocharis* (pullup muhly), *Agrostis* (bentgrass), *Trifolium/Mimulus* (carpet clover), *Calamagrostis/Oryzopsis* (shorthair), *Gentiana/Aster* (gentian-aster), and *Carex exserta* (short-hair sedge). Stepwise discriminant analysis is used to derive classification functions for quantitatively classifying new sites. A key to the classes is provided.

Retrieval Terms: meadow, meadow site, meadow ecology, meadow management, Sierra Nevada, classification