



United States
Department of
Agriculture

Meadows

“Why Are They Important?”

What is a Meadow?

In the simplest terms, a meadow is defined by the vegetation, the soil characteristics and the water within the meadow (referred to as the “hydrology”). The term “meadow” is not a technical term as much as a cultural term. Sierra Nevada scientists who study meadows have come to a consensus as to what a meadow is:

- A meadow is an ecosystem type composed of one or more plant communities dominated by herbaceous species.
- It supports plants that use surface water and/or shallow ground water (generally at depths of less than one meter, or three feet).

Woody vegetation, like trees or shrubs, may be found in meadows but is not dominant.

How Meadows Develop

Until recently, scientists thought that meadows developed by “succession”—shallow basins created and scoured by glaciers were filled with water to form a lake, then became filled with sediment to form a meadow and finally turn into a forest as trees fill in the meadow. We know now that not all meadows are part of this successional path: not all will change at some future point into a forest. Meadow location, rather, is determined by topography. On the western slope of the Sierra Nevada, for instance, meadows commonly occur where a relatively flat landform is surrounded by steep terrain with a



large watershed that offers a shallow water table and fine textured soils.

Specific to Sierra Nevada's Meadows

How do Sierra Nevada meadows differ from meadows in other parts of the country? The Sierra Nevada's deep snowpack, relative to other mountain systems, is a critically important source of water for high-elevation meadows. California has a “Mediterranean” climate with very little summer precipitation compared to other parts of the country. Therefore, while meadows elsewhere may depend on year-round precipitation, Sierra Nevada meadows rely on shallow underground water supplied by snowmelt. Finally, the Sierra Nevada is dominated by granitic bedrock which allows the meadows to have a neutral to slightly acidic pH runoff rather than an alkaline runoff, which affects the stream conditions downstream from the meadows.

Meadow's Many Functions

Besides supporting species not found elsewhere, meadows do many other things. They filter sediment from water flowing from surrounding slopes—providing clean water for

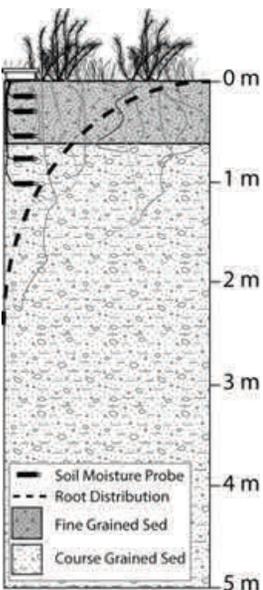
The Eldorado National Forest *Land and Resource Management Plan* defines a meadow as “a grassy opening 0.1 acre or larger, dominated by perennial sedges, rushes, and grasses (wet meadow) or perennial grasses and forbes (dry meadow).”

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wildlife and healthy habitat for aquatic animals that live in lakes and streams. Meadows provide an important breeding ground for invertebrates (such as insects), a key food source for many birds, amphibians, and reptiles.

Meadow plants also provide food and habitat structure for small mammals that, in turn, provide an important prey base for raptors, coyotes, and other predators.



Meadows are sponges, absorbing water as snowpack melts and holding that water like an underground water tank. By holding the water in the mountains, the risk of flooding in the Sacramento Valley is reduced significantly. Then, later in the summer, this stored water feeds the many streams and rivers in the mountains, so they continue to flow during the long dry summers.

Our water delivery systems, including reservoirs and canals, are dependent on the role that meadows play in maintaining the flow of rivers and streams. In addition, much of California's drinking water is filtered, at least in part by meadows.

Maintaining Meadow Health

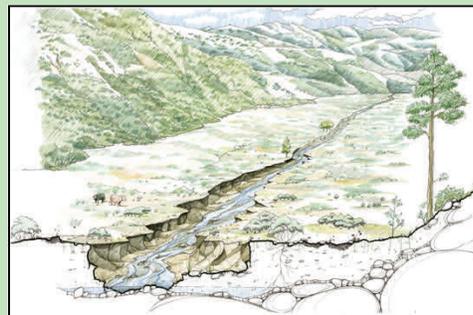
Mountain meadows have a short growing season with relatively shallow soil and may be very sensitive to even small changes in water availability. Factors that alter the underlying hydrology of meadows have the potential to shift species composition and affect how meadows benefit downstream conditions. Human-induced factors may include trampling, grazing, roads, non-native plants, altered fire regimes, air pollutants and altered precipitation (especially the timing and amount of snowmelt).

The National Forests of the Sierra Nevada have direction to maintain and restore the hydrologic connectivity of meadows by, among other things, identifying roads and trails that intercept, divert, or disrupt natural surface and subsurface water flow.



Meadow Health

A healthy meadow has a diverse mosaic of habitats with wet meadow and riparian vegetation; surface water flow from snowmelt is found in channels, while flood flows spread out across the meadow, which allows sediment deposition across the meadow and attenuated flood flows; a high ground water table that is fed from snowmelt percolating down and allows stream channels to flow later in the summer season by drawing from groundwater.



Over time, the health of meadows can be degraded where activities interrupt or alter the natural flow and percolation of water within the meadow. An unhealthy meadow is one in which the natural storage of water is reduced, the groundwater table is lowered, flood flows are confined to channels with no inundation during floods; stream channels are disconnected from the meadow floodplain; reduced percolation occurs; wetland vegetation is replaced by xeric (or dry) vegetation; stream channels are incised with increased sediment transport; and soils are compacted. These changes reduce the ability of meadows to provide key wildlife habitat and perform important ecological functions.

Illustrations by Restoration Design Group for American Rivers

Thanks to the Yosemite National Park website for illustrations and information. For more, information, go to: <http://www.nps.gov/yose/naturescience/meadows.htm>