Manitou Experimental Forest (Colorado)

Introduction

The 6,758-ha Manitou Experimental Forest straddles the watershed of Trout Creek, a tributary of the South Platte River, about 48 km northwest of Colorado Springs, Colorado. The Manitou Park area contained within the forest was originally the property of Dr. William Bell, an English physician and Colorado pioneer who had established a number of enterprises on the property, including logging, ranching, resort hotels, and a trout farm. He ultimately gave the remainder of his holdings to Colorado College to establish a school of forestry and be used as a forestry field camp. The Manitou was established in 1936 from land donated to the Forest Service after Colorado College closed its forestry school, from surrounding National Forest System land, and from other purchased properties. As a result, the Manitou contains more than 100 private holdings within its borders, including a major subdivision occupying over 284 ha.

Climate

The climate is cool and dry with a 65-year average rainfall of 398 mm/yr. Summer temperatures can reach 32 °C, but nights are cool. Elevation ranges from 2,286 to 2,835 m. Winter snowfall is typically light, without a snowpack in many years. Although winter temperatures can fall below -20 °C, midday January temperatures often are as high as 10 °C. Summer thunderstorms can be intense, with large amounts of rainfall and lightning. Many trees are scarred by lightning.

Soils

Soils are derived from the weakly structured Pikes Peak granite and are highly erodeable. Most soils are poorly developed, with little organic matter except in riparian areas.

Vegetation

The Manitou is representative of the Colorado Front Range Montane ecosystem, containing extensive dry-site ponderosa pine and Douglas-fir forests interspersed with grassland parks and small aspen clones. Lodgepole pine and Engelmann spruce occur at higher elevations, with blue spruce, limber pine, and white fir in local areas.

Long-Term Data Bases

There are temperature and precipitation records for the headquarters weather station since 1937. Continuous hourly temperature, precipitation, and wind and soil temperature data have been available in electronic format since 1998. A National Atmospheric Deposition Program collection site has been on the Manitou for more than 20 years and a NOAA satellite weather station has been located at headquarters for a number of years. Streamflow and water-quality data for Trout Creek were recorded and published for some years.

Long-term (30-year) growth records for ponderosa pine plots thinned to various stocking levels are also available. Seedfall records from shelterwood and seed-tree overstory plots, natural seedling germination and survival, and growth and survival data for planted trees are available from 1981 to 2001 (Unfortunately, this study burned in the Hayman Fire of June 2002.) A population of flammulated owls has been monitored on the Manitou since 1978.

Research, Past and Present

Early research at the Manitou focused on range management, including revegetation of abandoned fields, grazing management in native and seeded pastures, and watershed management in gully control, stream sedimentation, surface runoff, and infiltration. Watershed management studies through the mid-1980s centered on water quality and examined the effects of cattle grazing and recreational and home development on bacterial pollution in lakes and streams, and resulting effects on aquatic biota. The water-quality research program has been terminated.

Range management research conducted through the late 1970s included studies of rotational grazing systems, seasons of use, and overstory/understory relationships. The range research program has also been terminated.

In the 1980s, the research emphasis shifted to studies on the growth and regeneration of ponderosa pine and on wildlife habitat. Research centered on ponderosa pine regeneration for both even- and uneven-age systems, initial tree spacing and growth, provenance testing of ponderosa pine, growth and yield in uneven-aged and irregular stand structures in ponderosa pine, and old-growth characteristics of Front Range ponderosa pine. Other studies include dwarf mistletoe effects and control in ponderosa pine, and studies of the habitat requirements, habitat use, and population dynamics of flammulated owls.

Today, research at Manitou has been broadened to gain a better understanding of ponderosa pine ecosystems, the disturbance regimes active within them, and ways to best manage these urban-interface forests. Current studies include assessment of silviculture techniques to restore fire-dependent forests to a healthy condition, studies of fire history, fuels assessment, quantifying soil heat fluxes during prescribed burning under a spectrum of fuel loadings, studies of insect and bird biology, an intensive study of dwarf mistletoe ecology, and a major effort to assess human values and preferences in urban-wildland interface forests.

Major Research Accomplishments and Effects on Management

Research at Manitou has made major contributions to our understanding of ponderosa pine ecosystems. Individual publications are too numerous to mention here and are summarized on the forest's website.

Collaborators

Researchers from the USDI Geological Survey, Colorado State University, University of Colorado, Colorado School of Mines, University of California, Colorado College, Denver Museum of Nature and Science, as well as nonaffiliated, privately funded researchers have worked on the Manitou.

Research Opportunities

The Manitou is uniquely situated for studies of wildland-urban interface interactions, recreational values, and land-management effects on water quality delivered to urban areas. The forest is dissected by a major state highway, is in close proximity to both Denver and Colorado Springs metropolitan centers, and contains and is adjacent to several picnic and campground facilities administered by the Pikes Peak Ranger District of the Pike and San Isbel National Forest. Collaborative research opportunities that fit within the overall research goals of the Rocky Mountain Research Station and are compatible with other ongoing research at Manitou are welcomed.

Facilities

The Manitou has excellent facilities. Most of the buildings were constructed in the late 1930s by the Works Progress Administration out of locally quarried stone and are listed on the National (and Colorado) Register of Historic Places. Buildings include a large lodge for meetings and housing for research field crews (available for a nominal fee), an office/laboratory, manager's residence, and two large garages, one with a shop. Also available are a small bunkhouse and a barn/shed storage area. A concrete pad with RV hookup and an officially designated helipad complete the headquarters facilities.

Lat. 38°6′0″ N, long. 105°5′30″ W

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