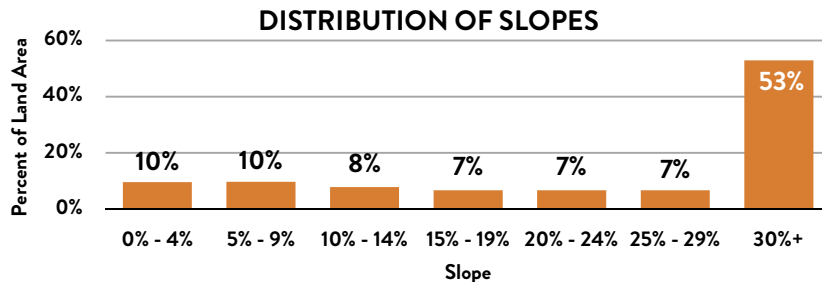




NATURAL ENVIRONMENT

TOPOGRAPHY

Elevation: Low – 6,170 ft.; High – 7,475 ft.; Range – 1,305 ft.



Source: U.S. Geological Survey, National Elevation Dataset

GEOLOGY

Manitou Limestone: Sedimentary rock, known as Manitou Limestone, underlies much of Manitou Springs and the surrounding area. Known as a Karst formation, this limestone is the only remnant of a much larger formation that has since eroded elsewhere along the Front Range. Other rock formations underlying the City consist primarily of granite southwest of the Ute Pass Fault, and sandstone with some limestone northeast of the fault.

Faults: Two fault lines pass through or near the City: the Ute Pass Fault and the Rampart Range Fault. Neither is active or has indicated major movements in the past 750 thousand years. It is thought that the carbon dioxide gas found in the mineral springs migrates from deep within the Earth's outer mantle to Manitou Springs by way of these two faults.

Soils: The most prevalent soil type is a mix of Connerton, followed by Fortwingate and Kutler-Broadmoor. These soils are predominantly loamy and well-drained, and tend to be susceptible to erosion from both wind and water. Other soils, particularly those located in the northern part of the City along Fountain Creek, do not drain well when fully saturated (during heavy rainfall, for example), increasing the potential for runoff and sheet flow.

Geologic Hazards: Geologic hazards in the City include landslides, rock fall, and other debris slides. While a small area of Manitou Springs is susceptible to landslides, over 20% of the City's land area is susceptible to debris slides, stabilized landslides, or unstable soil (on steep slopes). 41% of the City is underlain with stable soil or bedrock.



TRENDS & KEY ISSUES

Steep Slopes

Over half of the land area in the City is at a 30% or greater slope, which imposes limitations on development.

Hazards and Risks

While the landscape and natural environment of Manitou Springs provides a beautiful backdrop to the City, it also places the City at risk from natural hazards. Certain areas of the City are at risk from: geologic hazards, such as landslides or rock falls; flooding along the City's streams and creeks; and wildfire, which play an important role in many of the ecosystems surrounding the City.

TRENDS & KEY ISSUES

Impacts from Wild Fires

Recent wildfires in the area, particularly the Waldo Canyon Fire in 2012, altered many of the soils in the burn areas. The intense heat generated during these events created what are known as “hydrophobic” soils, or soils that repel water. During rain events, almost all of the water that falls on these soils will become runoff, adding to the volume of water that is travelling down the streams and creeks surrounding the City. During particularly intense events, this has the potential to exacerbate the City’s risk from flooding. Runoff can also lead to landslides and other debris flows in the burn areas. A 2012 USGS study found that debris-flow probabilities in watersheds impacted by the Waldo Canyon Fire ranged from 1 to 54 percent in a 2-year storm to 1 to 82 percent during a 25-year storm.

CLIMATE

Temperature: On average, July is the warmest month in Manitou Springs, with an average high of 85° F and an average low of 57° F. January is the coldest month, with an average high of 43° F and an average low of 18° F.

Precipitation: Annual precipitation is around 16.4 inches, with most precipitation falling during the month of August.

Snowfall: Manitou Springs receives 7.4 inches on average per month during the winter. The maximum recorded monthly snowfall over the past 10 years was 25.4 inches during February 2015.

HYDROLOGY

Mineral Springs and Aquifer: Due to their susceptibility to erosion, the Manitou Limestone and other sedimentary rocks underlying the City form an aquifer, commonly known as a karst type aquifer, which supplies the City’s mineral springs through cracks and enlarged fractures. The head or high point of the aquifer is estimated at about 6,400 feet, and at one point included the cave system at the Cave of the Winds. Recharge to the aquifer primarily occurs where the aquifer host strata is directly exposed to stream flows in upper Fountain Creek (in West End of City) and in Williams Canyon.¹

Watersheds: Manitou Springs is located in the Upper Fountain Creek sub-watershed, part of the larger Fountain Creek watershed. Both form part of the Arkansas River Basin.

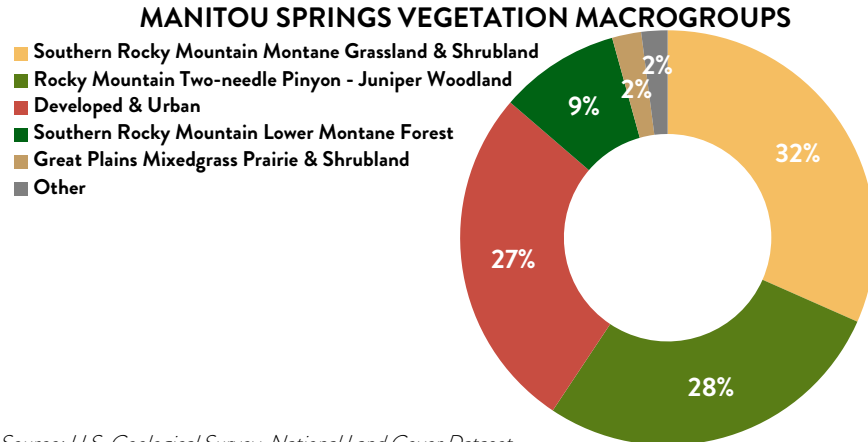
Streams & Creeks: A number of streams and creeks flow through Manitou Springs, including:

- **Fountain Creek:** flows south and east from its headwaters near Woodland Park, through Colorado Springs to its confluence with the Arkansas River in Pueblo.
- **Ruxton Creek:** flows east from its headwaters near Pikes Peak to its confluence with Fountain Creek in near the intersection of Ruxton Ave. and Manitou Ave.
- **Sutherland Creek:** flows north from its headwaters near Mount Arthur to its confluence with Fountain Creek, east of the intersection of Manitou Ave and US 24.

¹“Vulnerability of Manitou Spring’s Mineral Springs Aquifer and Williams Canyon Flood Channel Contributing Factors,” presentation to Manitou Springs City Council by Dave Wolverton.

Floodplain: 193 acres of Manitou Springs fall within a 100-year floodplain (approx. 10% of the City’s total land area). An additional 19 acres fall within the 500-year floodplain.

VEGETATION & WILDLIFE



Source: U.S. Geological Survey, National Land Cover Dataset

Vegetation Types: Plant-types found in the City tend to be a mix of broadleaf deciduous shrubs (such as Gambel Oak) in lower elevations and south-facing slopes, and taller evergreen coniferous trees (such as Ponderosa Pine and Douglas Fir) in higher elevations and north-facing slopes.

Ecological System Patches: Of the vegetation types noted above, the Colorado Natural Heritage Program (CNHP) identifies the Southern Rocky Mountain Montane Grassland & Shrubland (also known as Oak and Mixed Mountain Shrub) vegetation type as forming two notable ecological patches that run along the foothills of the Front Range. The northern patch extends from US 24 north to Palmer Lake, and the southern one from US 24 south to just west of Broadmoor in Colorado Springs. These two patches are notable due to their size, but show a large degree of anthropogenic impact. CHNP identified human population growth as the most serious threat to these patches.

Wildlife: Manitou Springs is home to a number of wildlife species, including black bears, mule deer, coyotes, foxes, mountain lions, great-horned owls, and red-tailed hawks. The City most likely does not contain any habitat suitable for federally threatened or endangered species; however, a number of species considered by CNHP to be rare and imperiled are known to be present in the areas surrounding the City.

Cave of the Winds Potential Conservation Area (PCA): In 2001, CNHP identified a ¾ mile area surrounding the Cave of the Winds as a Potential Conservation Area for the Townsend’s Big-Eared Bat. The bats’ roosting

TRENDS & KEY ISSUES

Habitat

U.S. Geological Survey land cover data shows that the vegetation and habitats found in Manitou Springs are similar to those found elsewhere along the Front Range. Data from the Colorado Natural Heritage Program suggests that the habitats found in the natural areas in and adjacent to Manitou Springs are not of high priority for the long-term survival of the species and natural communities targeted by CNHP. However, CNHP ranks Oak and Mixed Mountain Shrub ecological systems as being “weakly conserved” statewide. This means that although there are plenty of healthy and intact patches of this ecosystem type across the State, these patches are not well protected from future threats (such as human development). While the majority of the City’s protected open space parcels fall within an Oak and Mixed Mountain Shrub patch identified by CNHP, these protected areas account for a small portion of the patch’s total size. According to CNHP, the minimum size for a well-functioning patch of this type is 5,000 acres; 20,000 acres is an optimal size. This underscores the importance of regional collaboration in the conservation of large landscapes.

TRENDS & KEY ISSUES

Habitat Restoration Projects

The Fountain Creek Restoration Committee (FCRC) is a volunteer group that promotes collaboration to improve the native habitat and public access to and enjoyment of Fountain Creek. FCRC spearheaded a collaborative effort between City Council, State of Colorado Division of Wildlife, Trout Unlimited and others to generate \$400,000 that was invested in Fountain Creek aquatic habitat improvements and bank stabilization work. Due to the severe flooding impacts in 2013, an updated assessment of the Creek is needed.

Wildlife

The City's location adjacent to mountainous open space can lead to frequent encounters with wildlife. Black bears, mountain lions, and coyotes are notable larger mammals present in the area. In addition, the following rare and imperiled species are known to be present in the areas surrounding Manitou Springs:

- American Peregrine Falcon
- Ovenbird
- Townsend's Big-eared Bat (*Corynorhinus townsendii pallescens*)
- Moss's Elfin (*Callophrys mossii schryveri*)

sites are not visited by tours of the Cave of the Winds, but CNHP notes that additional development of the cave system could impact roosts, which are highly sensitive to human disturbances.

LOCAL AND REGIONAL PARTNERS

Local and regional partners working in Manitou Springs on natural environment issues include:

- Fountain Creek Restoration Committee
- Bear Smart Committee
- Transition Town
- Manitou Environmental Citizens Action (MECA)
- Mineral Springs Foundation
- Pikes Peak Area Council of Governments

RELATED PLANS & STUDIES

- [*The Fountain Creek Corridor Restoration Committee Master Plan \(2009\)*](#) – Fountain Creek Restoration Committee
- [*The State of Colorado's Biodiversity \(2012\)*](#) – Colorado Natural Heritage Program
- [*Red Mountain Open Space Land Stewardship Plan \(2010\)*](#) – City of Manitou Springs
- [*Iron Mountain Open Space Land Management Plan \(2013\)*](#) – City of Manitou Springs
- [*Studies Relating to the Mineral Springs \(2011\)*](#)- City Manitou Springs