

## NATURAL RESOURCES

*If future generations are to remember us with gratitude rather than contempt, we must leave them something more than the miracles of technology. We must leave them a glimpse of the world as it was in the beginning, not just after we got through with it.*

**President Lyndon B. Johnson, on the signing of the Wilderness Act of 1964**

### *Climate*

Catoctin Mountain Park and the surrounding area generally experience a mild, four season climate, but can experience extreme weather at times. Between 1998 and 2006 five severe storm systems have produced significant flood and wind damage to the forest, streams, and park road system. These have included a microburst, tornado, two hurricanes, and a severe summer thunder storm.

The local climate is influenced by the elevation. Most of the park is above 1000 feet with a maximum elevation of 1880 feet. Annual precipitation over the past 30 years averages 47 inches with monthly distribution being fairly even throughout the year. Snowfall averages 34 inches per year, but has been as high as 82 inches. Summers are usually warm, with temperatures averaging 80 degrees Fahrenheit, but can exceed 90 degrees. Winter temperatures average around 30 degrees Fahrenheit, but lows have been recorded at -10 degrees.

### *Geology*

Catoctin sits at the boundary of the Piedmont and Appalachian physiographic provinces. The Appalachian province forms the eastern front of the Blue Ridge Mountains and is characterized by steep slopes and rocky terrain. The physical environment of Catoctin Mountain Park is composed of ancient weathered mountains with talus slopes, large rock formations and two deeply cut stream valleys. This collection of geologic features illustrates well the earth shaping processes of volcanism, faulting and folding, and weathering.



Chimney Rock.  
Photo by NPS.

The park is underlain by two main geological features. The eastern third of the park is typified by pinkish quartzite formations. The most resistant quartzite forms such promontories as Chimney Rock, Wolf Rock, and the talus fields north of Thurmont Vista. The western two-thirds of the park is dominated by a greenish-gray metamorphosed lava called greenstone. Large cliffs of this material create natural overlooks such as Hog Rock and occasional boulder fields. Most of the visible rock at Catoctin dates from Precambrian or from Cambrian times (500 million years ago or more). The oldest rock is greenstone which forms Cunningham Falls and Hog Rock. This is from the Precambrian Period of 600 million years ago.

### *Soils*

An extensive soil survey was completed in 1994 by the Natural Resources Conservation Service, USDA. This survey described 12 soil series with four types (Ravenrock, Highfield, DeKalb, and Bagtown) covering 92% of the park. Park soils are generally acidic, stony, and moderately to highly erodible. Soils in the eastern portion of the park are derived from Weaverton quartzite and tend to be thin, highly permeable, and well-drained. Soils in the western part derived from greenstone, are deeper, more moist, and higher in nutrients.

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*When the well is dry, we know the worth of water.*  
**Benjamin Franklin**

### **Water Resources**

The water resources of Catoctin Mountain Park play an important role in the ecological health of the watersheds for the Monocacy and Potomac Rivers, and the Chesapeake Bay. They are also vital to the native fauna and flora of the park, and to support the recreational use by park visitors. They include groundwater and a variety of small streams, seeps, springs, and wetlands.

Two major permanent streams flow through the park and drain its principal watersheds. Big Hunting Creek drains 34.5% of the park. The park comprises only 7% of the total Big Hunting Creek watershed. Owens Creek drains 64% of the park, equivalent to 14.5% of its total watershed. On the west side of the park, Antietam Creek drains 1.5% of the park.

The high water quality of Catoctin's streams support healthy aquatic communities including a viable population of brook trout, the only trout species native to this region. Big Hunting Creek offers an outstanding recreational trout fishery. It was the first fly fishing only area established in the National Park System, and the first in the state of Maryland. Catoctin Mountain Park is also the only NPS area within the National Capital Region with brook trout.

The riparian zone is the most biologically diverse part of the park with 91 taxa of macroinvertebrates and habitat for most of the 11 state-listed threatened and endangered (T&E) species found in the park, including two rare orchid species.

Groundwater provides the water source for all visitor and staff facilities including three cabin camps, two campgrounds, two picnic areas, a visitor center, and park offices. There is no surface reservoir or municipal water supply. Future development within and adjacent to the park will increase the demand for groundwater. With this increased use, there is potential for a decrease in the natural flow to seeps and springs impacting their associated plant and wildlife. Major floodplains and streams valleys outside the park should be fully protected by easement, developer dedication, or fee acquisition as described in the Frederick County Parkland Plan and set forth in Maryland State Planning Policy.

Groundwater at Catoctin Mountain Park is a limited resource and is located in pockets in metamorphic bedrock. There are no large underground aquifers. The best yields occur in fractured areas and typically run around 10 gallons per minute. To meet the demands for the park water system, a well flow rate of at least 20 gallons per minute (gpm) is needed. In 2006, four attempts were made to develop new wells to provide backup on each side of the park. Only one produced a sufficient flow (20 gpm). Technical assistance has been requested from Water Resource Division to evaluate the current water system and identify the best areas to develop wells for future use.



Distillery Run  
Photo by NPS

There is also a growing concern for degradation to water quality of park streams from residential and agricultural use in areas upstream of the park. Operation of a new sewage treatment plant, development of a large hog farm, increased timber harvest, and new home construction have all occurred in the past five years. State and county highway maintenance practices have widened roads; applied herbicides on a large scale along Route 77 and dredged small wetland areas in the headwaters.

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### *Air Quality/Night Skies/ Soundscapes*

Catoctin has relatively good air quality, dark night skies, and a quiet soundscape. Increased development of the surrounding area has potential to degrade these features by increasing regional haze and ozone, traffic noise, and light pollution. The 2002 Visitor Study indicated that park visitors place a high value on air quality, clear night skies, and a quiet soundscape. Air quality was the second highest element affecting the overall visitor experience. 50% of visitors listed viewing night skies as extremely important, and 73% listed natural quiet sounds as extremely important. Therefore, we believe that CATO should have a complete air quality monitoring station in the park since none exists in the National Park System between Shenandoah NP (130 miles to the south) and Delaware Water Gap National Recreation Area (230 miles to the north).

Air pollution is among the most serious and wide-ranging problems facing the parks today. Of the 391 parks within the National Park System, 150 are located in parts of the country that fail to meet one or more national healthy air standards. Despite a 30-year congressional mandate to restore pristine air to the parks for current and future generations, many of America's national parks remain plagued by airborne hazards. Increasingly, haze diminishes once-majestic views of 100 miles or more to just a few miles. Air pollutants can upset the balance of plant and animal life, while mercury and other toxins poison wildlife. Climate change, driven by emissions of greenhouse gases, threatens to cause some of the most profound and irreversible damage to the parks ever seen: Glaciers will disappear from Glacier National Park, and Joshua trees will disappear from Joshua Tree National Park.

There have been some important advances toward clearing the air. The Clean Air Act's 1990 acid rain program reduced some of the pollution that impairs park vistas and acidifies park streams. Environmental Protection Agency (EPA) limits on emissions from autos and power plants have reduced some pollutants that cause unhealthy smog and damage trees and plants. More than 30 species of trees found in Great Smoky Mountains National Park show some signs of ozone damage, and not surprisingly this same park has experienced nearly a year's worth of unhealthy air days since 1990. Pollution has cut summertime visibility along Blue Ridge Parkway by 80 percent.

Frederick Co. is included in the Washington DC/MD/VA Metropolitan Statistical Area (MSA) and is moderate non-attainment area for 8 hour ozone. The highest levels of ozone occur during the summer from May to October when increased temperature and sunlight enhance its formation. This area was previously classified as severe non-attainment until June 15, 2005 when the 1-hr standard was revoked for DC, most of MD (except Washington Co.) and most of VA. The designation names refer to how long the state has to clean it up. A moderate designation means that EPA expects the MSA to reach attainment for the 8-hr ozone standard by 2010. Under the 1-hr standard they had until 2015. The current standard is 0.08 ppm (or 85 ppb) over any 8-hr period. State Implementation Plans (SIP) for ozone are due by April 2007. In our region the Metropolitan Council of Governments (MWCOG) is the coordination entity ([www.mwcog.org](http://www.mwcog.org)) for air quality.

The DC/MD/VA MSA is also a non-attainment area for fine particles smaller than 2.5 micrometers in diameter (PM<sub>2.5</sub>). The average annual standard is 15 ug/m<sup>3</sup>. Frederick Co. is very close to that standard. The average daily standard is 35ug/m<sup>3</sup>. That level is rarely seen without an exceptional event (e.g. fire). Besides being a health concern, PM<sub>2.5</sub> is responsible for most of the visibility impairment.

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### *Vegetation*

Catoctin Mountain Park lies on the eastern edge of the Blue Ridge province and at the junction of the southern and northern Appalachian regions. Because of its location, the park supports varied deciduous forest types and is an excellent example of a second growth forest restored through conservation efforts and nature's resiliency. The eastern portion of the park was timbered extensively in the early 1800s to provide charcoal for the Catoctin Iron Furnace, located five miles south of Catoctin Mountain Park in Cunningham Falls State Park. Today, there are over 754 species of plants (60 species of trees) present. Six plants are state-listed T&E species including the large purple-fringed orchid *Platanthera grandiflora*, leatherwood *Dirca palustris*, and long-bracted orchid *Coeloglossum viride*. Since 1990 these plants have been protected with fenced exclosures.

A number of problems threaten park vegetation with eventual impacts to the entire forest ecosystem. Deer browse, plant disease, insect pests, invasive exotic plants, and storm damage have had significant impacts in the past 10 years. Gypsy moth *Lymantria dispar* has been present since the 1980s and the wooly adelgid *Adelges tsugae* first attacked hemlocks in the park in 1993. Alien species impact approximately 1,500 acres in the park with restoration occurring at the rate of 250 acres every five years. Dealing with these forest threats is a major thrust of the current resource management program. The top priority is the development and implementation of a management plan to deal with the overpopulation of white-tailed deer to assure natural abundance, biodiversity, and ecological integrity.



Purple Fringed Orchid  
Photo by NPS.

### **Hazard Tree Program**

The park conducts a hazardous tree program to identify and remove trees which are a potential threat to public safety or park facilities. An aging forest, insect pests, storm damage, and drought continually impact trees. Each year, a contracted arborist prunes and/or removes approximately 200 trees.

### **Wildland Fire Management**

Fire is an integral component of the ecosystem at Catoctin Mountain Park but cannot be allowed to burn as a natural process (wildland fire) because of management constraints that include an increasing urban interface with the Town of Thurmont, cultural resources, park infrastructure, adjacent farms and orchards, a growing external residential presence, and the Presidential Retreat. Even though wildland fire would not be used to accomplish natural resource objectives, prescribed fire (burning under certain weather conditions) may be used as a tool, on an experimental basis, to accomplish some resource management objectives. Research experimental burns would limit the burn area to five acres or less, and would determine fire fuel characteristics and evaluate fire to enhance the regeneration of fire dependent species such as Table Mountain Pine *Pinus pungens*.

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### *Wildlife*

Of the native animal species known to historically range within the area of Catoctin Mountain Park, the bison, elk, gray wolf, eastern cougar, porcupine, and fisher have been extirpated. Bobcat, beaver, coyote, and black bear occur in the area but are not known to reside in the park. Sightings of these animals are all on the increase since the early 1990s. Wildlife such as brook trout *Salvelinus fontinalis* and wild turkey *Meleagris gallopavo* have returned to thrive in this protected habitat.

Over two hundred and fifty species of native wildlife exist in the park today. Mammals found in the park are fairly typical for this region and include the woodchuck, gray and red squirrels, eastern cottontail rabbit, northern flying squirrel, bats, opossum and red fox. The most abundant large animal in the park at present is the white-tailed deer, whose population appears to have grown beyond available food resources. The most important critical need for natural resources is finding long-term funding to implement the deer management plan. Over two hundred species of birds, including wild turkeys, are thought to occur in the park during some part of the year. While two hundred and fifty species of butterflies and moths have been identified little is known about the terrestrial insect diversity of the park. The park is also habitat for approximately thirty species of reptiles and amphibians, including the eastern timber rattlesnake *Crotalus horridus*.

The park is adjacent to private property and state park land where hunting is allowed. Deer are abundant on national park lands which causes continuing pressure from poachers.



Pileated Woodpecker. Photo by NPS.

### *Critical Needs for Natural Resources*

Natural resource research, and inventory and monitoring activities are essential components of the resource management program. Existing monitoring of air and water quality, deer population and impacts to vegetation, forest pests and disease, and distribution of invasive plants must be continued. The ongoing fungi research, and the vegetation classification/mapping projects need to be completed. Future projects include establishing relative abundance and distribution of species of concern, and a comprehensive insect survey.

Increasing population and subsequent development are rising in Frederick and Washington Counties. With this growth outside the park boundary comes the looming challenge to protect an adequate water supply, address environmental pollution, and prevent and/or manage flooding. Joint management of watersheds with other stakeholders in ways that respect, conserve and restore stream corridors, riparian forest buffers, wetlands and floodplains, and aquifer recharge areas and protect their hydrologic and water quality functions are needed.