



Mid-Atlantic Network

Weather & Climate Resource Brief



Fredericksburg & Spotsylvania NMP

Shenandoah National Park 2014 Status & Trends

In 2014, nine weather observing stations were selected to report the weather of Shenandoah National Park. The park is located in the Western Piedmont, Northern Virginia, and Central Mountains climate divisions of Virginia.

2014 was characterized by:

- *Lower than average temperatures with a very cold winter and a cool summer.*
- *A mild spring and fall that resulted in a growing season that was much longer than average.*
- *Annual precipitation totals that were variable across the park.*

Temperature: In 2014, annual temperatures were well below the 30-year normal despite a warm spring. Overall, 2014 tied as the 29th coolest year in the 120 year record for the Central Mountains.

The winter began colder than normal with January temperatures more than 7°F (4°C) lower than average in some locations. February and March were also unusually cold and the 2014 winter ultimately ranked as the 13th coldest since the late 1800's. As one might expect, the number of sub-freezing days for the year was above normal.

In contrast to the cold winter, the spring season (April – June) was unseasonably warm and tied as the 20th warmest on record for the Central Mountains. The trend reversed again in summer with temperatures often 2-3°F (1-2°C) below normal and the summer being the 31st coolest on record for the Western Piedmont. Luray's maximum temperature for the year was only 93.0°F (33.9°C). In addition, the number of hot days was less than half of normal at both Luray and Staunton weather stations.

Although November was very cold, a warm October and mild December created a slightly warmer than average fall season. The warm spring and fall helped

Objective

Document current status and long-term trends in air temperature and precipitation at multiple temporal scales (e.g., daily, monthly, seasonal, annual, and decadal) and spatial scales (e.g., individual stations and aggregated stations such as climate divisions) utilizing existing weather and climate monitoring programs and datasets.

create a growing season that was 29 days longer than historic averages.

Precipitation: Precipitation totals in 2014 were variable across the park. They were close to average in the Western Piedmont and Central Mountains but very dry in Northern Virginia.

January started dry but February was very wet. Snowfall was much higher than average with Luray reporting 43.6 inches (110.7 cm) compared to a long-term average of 17.9 in (45.5 cm).

The spring months had well above average precipitation, particularly in the

Climate Change

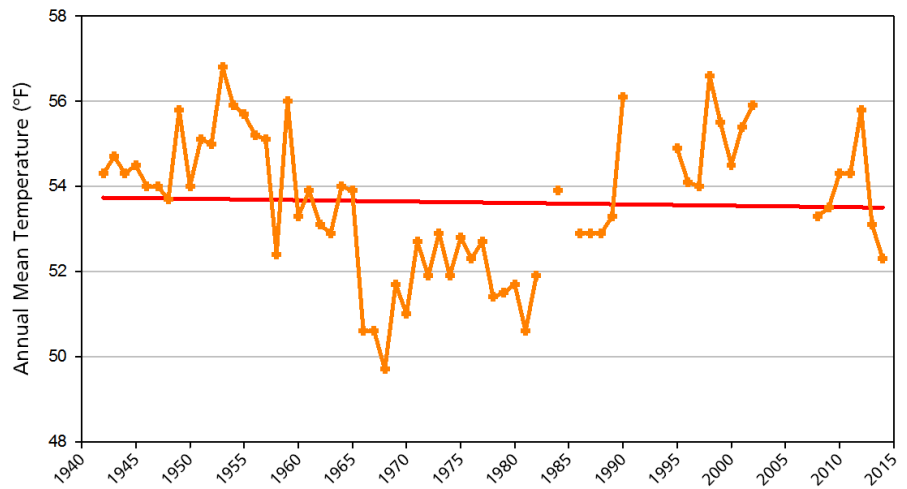
Climate change will affect natural and cultural resources in parks across the country. In order to characterize the extent of the threat, the National Park Service recently completed a climate change exposure assessment for 289 parks. In the study, recent climate conditions were compared to historical normals (i.e. post 1901). For Shenandoah NP specifically, none of the recent

temperature or precipitation metrics was determined to be "extreme" when compared to historical periods. In contrast, all of the other parks in MIDN that were studied have recently experienced "extreme" climate conditions. See the following website for details: <http://www.nps.gov/subjects/climatechange/climateexposure.htm>.



Long-term Trends

A trend assessment of many weather metrics was conducted in 2014. The annual mean temperature for a nearby weather station (Luray, 1942-2014) is shown to the right. The trend line (in red) indicates that annual mean temperatures have decreased slightly at Luray. This is a single station and weather data can be highly variable and can be influenced by local conditions. There are also some missing recent data. Results should be interpreted with caution.



2014 Status & Trends...

months of April and May. In the three climate divisions in which the park resides, the spring of 2014 was between

the 12th to the 49th wettest since 1895.

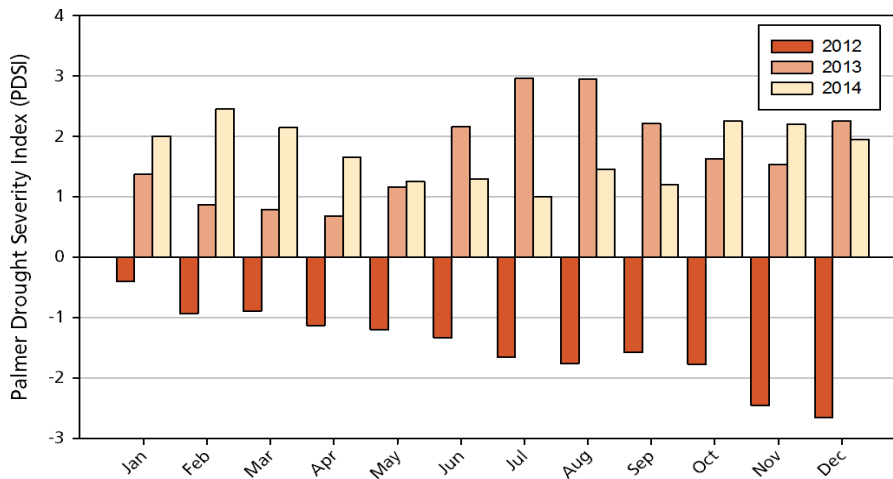
In contrast, the summer season ended up below normal for precipitation, largely due to a very dry September.

Precipitation totals ranged from 17 to 38 percent of normal during September. Autumn began wet across the park with October precipitation of 200 percent of normal at Big Meadows. Nevertheless, November and December were less than normal. There were no direct effects of tropical storms during 2014.

Drought: According to the Palmer Drought Severity Index, soil moisture remained near normal for the entire year in the Western Piedmont. Compared with 2013, this year was moister in the winter and fall though somewhat drier during summer months. In contrast, 2012 was drier throughout the year.

The full report can be found at: http://science.nature.nps.gov/im/units/midn/monitor/weather_climate.cfm.

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We thank Paul Knight, Kyle Imhoff, Chad Bahrmann, and Sonya Miller at the Pennsylvania State Climate Office for their assistance. Photos by James Comiskey (front footer) and Bill Tucker (below).



Palmer Drought Severity Index (PDSI) for the Western Piedmont, 2012–2014. Positive values indicate periods of above normal soil moisture (0 to 2: near normal; 2 to 3: moderate moisture; >3: very moist) and negative values indicate periods of drought (0 to -2: near normal; -2 to -3: moderate drought; <-3: severe to extreme drought).

Management Applications

- Illustrate the effects of local climate change.
- Document how yearly weather compares to long-term average.
- Help interpret natural resource observations in relation to that year's weather.
- Provide a baseline for future comparisons.



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Parks monitored: Appomattox Court House NHP • Booker T. Washington NM • Eisenhower NHS • Fredericksburg & Spotsylvania NMP • Gettysburg NMP • Hopewell Furnace NHS • Petersburg NB • Richmond NBP • Shenandoah NP • Valley Forge NHP

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