



Mid-Atlantic Network

Weather & Climate Resource Brief



Shenandoah National Park 2012 Status & Trends

In 2012, nine weather observing stations were selected to report the weather of Shenandoah National Park which is located in the Western Piedmont, Northern Virginia, and Central Mountain climate divisions.

2012 was characterized by:

- *significantly above average temperatures;*
- *the growing season was about three weeks longer than the 30-year average;*
- *lower than normal rainfall resulted in moderate drought conditions during the growing season.*

Temperature: In 2012, temperatures were well above the 30-year normal, with a very warm March and cool November. Temperatures were near or above normal for most of the year, resulting in

the warmest year in the 118 year record for the Northern Virginia climate division, and the 4th warmest for the Central Mountain.

January through March were mild with the end of the winter averaging temperatures as much as 5°F (2.7°C) above average, resulting in the 1st and 2nd warmest winters in Northern Virginia and Central Mountain divisions respectively. The number of cold days was near to below normal, but the lowest reading of the winter was about 12°F (7.7°C) higher than normal. Spring brought more seasonable conditions to the region. Again, July was warm, up to 6.9°F (3.8°C) above normal at Charlottesville, while the remaining summer months provided average temperatures. The maximum temperatures of the year were several degrees above the long-term average. The year ended with a chilly November (10th coldest) and milder December (11th warmest). The growing season was about three weeks longer than the 30-year average.

Objectives

1. *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.*

Precipitation: precipitation totals in 2012 averaged somewhat below normal throughout the park. Wet spells were notable in August and late October while dry spells were most pronounced in March-April and November. Overall, reporting stations in the region tallied annual precipitation between 84 and 91 percent of normal values.

The winter months were dry, with March being the wettest. Snowfall totals were well below average, 4.3 in (10.9 cm) compared to the 17.9 in (45.5 cm)



Importance

Climate is a dominant factor driving physical and ecological processes, and is responsible for short- and long-term changes that have profound effects on park ecosystems. Individual storm events do occasionally alter the structure of plant and animal communities. Future climate changes will likely cause migrations of plant and animal communities both northward and to higher

elevations. Superimposed on these trends is a long history of human use in the region, with its associated landscape fragmentation that will influence the ability of the plant and animal communities of the MIDN's parks to adapt to climate changes. Because of its influence on the ecology of the park units and the surrounding areas, climate was identified as a high-priority vital sign.

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.

Long-term Monitoring

A total of 32 weather observing stations were selected across the network based on their proximity to the network parks, the representativeness of the station to each park's elevation profile, the type and frequency of observations, the period of record of the data, data availability, and the percentage of time a station reports a particular parameter. Some of the stations with a longer period of record are used for comparison to a

30-year normal, while others are used to illustrate monthly averages. Two drought indices are used to estimate the severity of drought in an area. The Palmer Drought Severity Index (PDSI) is based on soil moisture, while the United States Drought Monitor (DM) – Drought Intensity Index is a synthesis of multiple indices (including the PDSI) and impacts which represents a consensus of federal and academic scientists.

2012 Status & Trends...

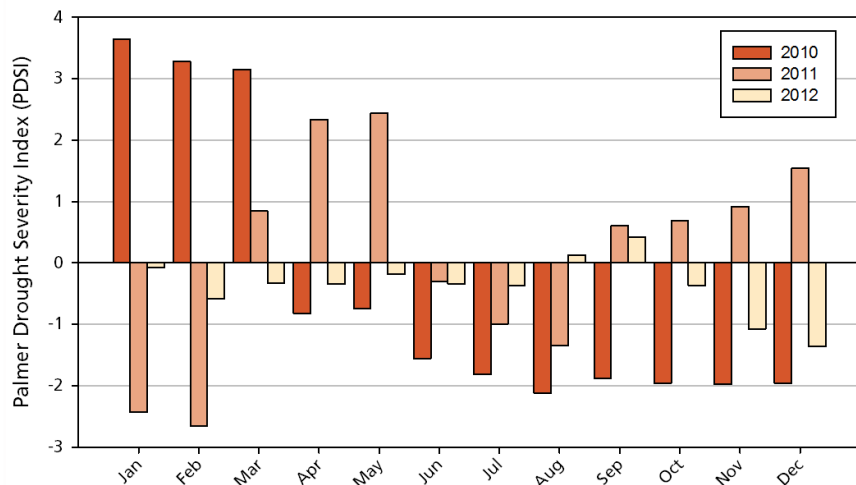
average at Luray over the past 30 years. Spring and summer had near normal precipitation, but varied across the three

climate divisions. The fall months were drier than normal with Staunton receiving half the average rainfall during the three months. October's totals were raised by the effects of Hurricane Sandy

which registered 3.8 in (96 mm) in a single day. November was the driest of the three months with Charlottesville receiving only 13 percent of the normal rainfall amount for that month, or 3.3 in (84 mm) below normal.

Drought: dry conditions dominated the first eight months of the year as the drought index steadily decreased to moderate drought values by August. Several active fronts deposited enough moisture to bring the index to neutral values by September and this continued for the most part until the end of the year.

The full report can be found at: <http://science.nature.nps.gov/im/units/midn/ProtocolWeatherandClimate.cfm>.



Palmer Drought Severity Index (PDSI) for the Western Piedmont, 2010–2012. Scale values are: 0 to ± 2 = near normal; ± 2 to ± 3 = moderate drought/moist; ± 3 to ± 4 = severe drought/very moist; ± 4 and above = extreme drought/moist.

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Photos by James Comiskey (front) and Stephie Burkart (below).

A Final Note

The Weather and Climate Monitoring Protocol is led by Paul Knight, Pennsylvania State Climatologist, and his team including Kyle Imhoff, Chad Bahrmann, and Sonya Miller at the Pennsylvania State Climate Office. In addition to the summary information available in technical reports, a near real-time data stream is available for the selected weather observing stations, along with monthly, seasonal, and annual summaries at: http://climate.met.psu.edu/gmaps/NPS_DEVELOPMENT/interface.php. This project is a collaborative effort with the Eastern Rivers and Mountains Network.



Lead Scientist
James Comiskey
Jim_Comiskey@nps.gov
Program Manager/Ecologist

Mid-Atlantic Network
120 Chatham Lane
Fredericksburg, VA 22405
science.nature.nps.gov/im/units/midn

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