



Mid-Atlantic Network

Weather & Climate Resource Brief



Hopewell Furnace National Historic Site & Valley Forge National Historical Park 2012 Status & Trends

In 2012, six weather observing stations were selected to report the weather of Hopewell Furnace NHS and Valley Forge NHP which are located in the Southeastern Piedmont climate division.

2012 was characterized by:

- *above average temperatures resulted in the 3rd warmest year;*
- *the growing season was about one week shorter than the 30-year average;*
- *the wettest year on record restored drought conditions to normal.*

Temperature: In 2012, temperatures were 2.4°F (1.3°C) above average. Day-time maximum temperatures were consistently higher than normal with only one month, November, experiencing below average readings, resulting in the 3rd warmest year in the 118 year record

of the Southeastern Piedmont.

January was warm with temperatures as high as 5.5°F (3.1°C) above the normal. The lowest readings of the year, 10.0°F (-12.2°C), were markedly above the normal value of -0.5°F (-18.1°C). Above-average temperatures continued in February and March which ranged as much as 10.0°F (5.5°C) warmer than average. The winter months ranked as the warmest since 1895 in the Southeastern Piedmont, or 6.1°F (3.4°C) above average. Spring continued slightly above average. July was hot, the 7th warmest in 118 years, and the number of hot days tallied was 33 compared with an average of 21 in a typical year. August and September brought near-average temperatures, such that overall the summer was slightly warmer than normal. Fall was generally warm despite a much cooler November, 3.0°F (1.7°C) below normal. The total growing season length was 167 days, or 7

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.*

days fewer than the 30-year average.

Precipitation: was about average across the region in 2012. The first three months raised concerns about serious drought. While January's rain and snowfall was near normal, a very dry February and March resulted in the 4th driest winter on record. Snowfall was below normal averaging 17.8 in (45.2 cm) compared to a normal value of 27.8 in (70.6 cm). Spring and summer were within normal ranges compared to the long-term record. November was very



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...

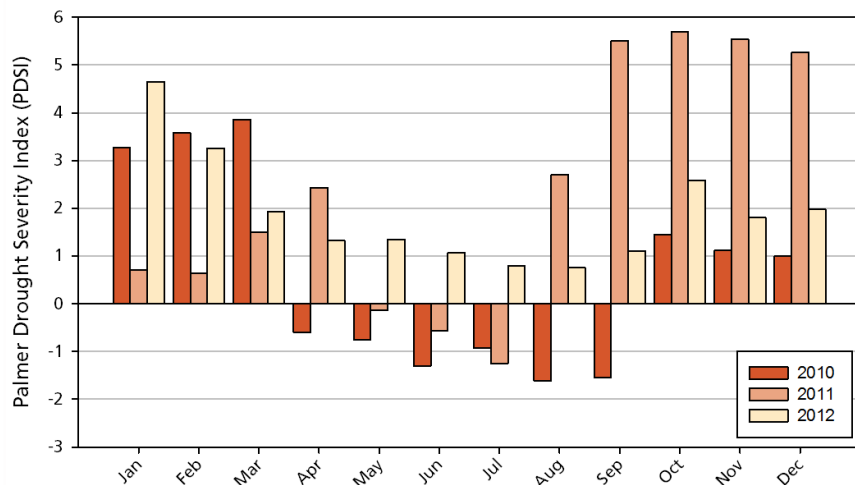
dry, with 2 in (49.8 mm) below normal rainfall. However, above normal precipitation in October and December

resulted in the 20th wettest fall for the Southeastern Piedmont, or 4.5 in (114 mm) above normal at West Chester. The effects of Hurricane Sandy were felt at the end of October, with the single wet-

test day of the year receiving 4.9 in (124 mm) of rainfall. The number of days where precipitation was heavy (above 1 in or 25 mm) was below normal, but the number of days where precipitation was extreme (above 2 in or 51 mm) was more than double the 30 year average.

Drought: 2012 started under very moist conditions, but gradually declined to normal values in late summer. The wet fall led to moderately moist conditions by the end of the year, though the dry November did see the numbers decline.

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.

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.



Photos by James Comiskey (front) and Suzanne Kreitzberg at www.suzannekreitzbergphotography.com (below).



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