



Mid-Atlantic Network

Weather & Climate Resource Brief



Hopewell Furnace National Historic Site & Valley Forge National Historical Park 2013 Status & Trends

In 2013, 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.

2013 was characterized by:

- average temperatures for the Southeastern Piedmont;
- the growing season was about one week longer than the 30-year average;
- above average rainfall maintained moderately moist conditions.

Temperature: In 2013, temperatures were normal based on long-term records at the West Chester weather station. Daytime maximum temperatures were higher than normal in six months and nighttime minimum readings experienced below average readings about half

of the year.

January was warm with temperatures as high as 4°F (2.2°C) above the normal. The lowest readings of the year, 6.0°F (-14.4°C), were markedly above the normal value of -0.5°F (-18.1°C). Average temperatures were noted in February, but March was colder than average with a mean of 2.4°F (1.4°C) below average. August was notably cooler. The highest reading of the year was 96.0°F (35.6°C) on July 9th which is near the long-term average of 97.0°F (36.1°C). Autumn featured a very cool month sandwiched between two relatively mild months ranking 34th warmest. Temperatures in October were above normal due to several warm nights, while November was much cooler than normal. The total growing season length was 180 days, or 6 days longer than the 30-year average.

Precipitation: Precipitation was

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.

above the long-term average across the Hopewell Furnace NHS and Valley Forge NHP region in 2013. Three of the four seasons finished with above-average precipitation.

While January's rain and snowfall were above normal ranging from 103-160 percent of average, the surplus was erased quickly by a dry February and March. The late spring and early summer became moister with June having well-above normal rainfall. April brought the least rainfall for the season, but May

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.

2013 Status & Trends...

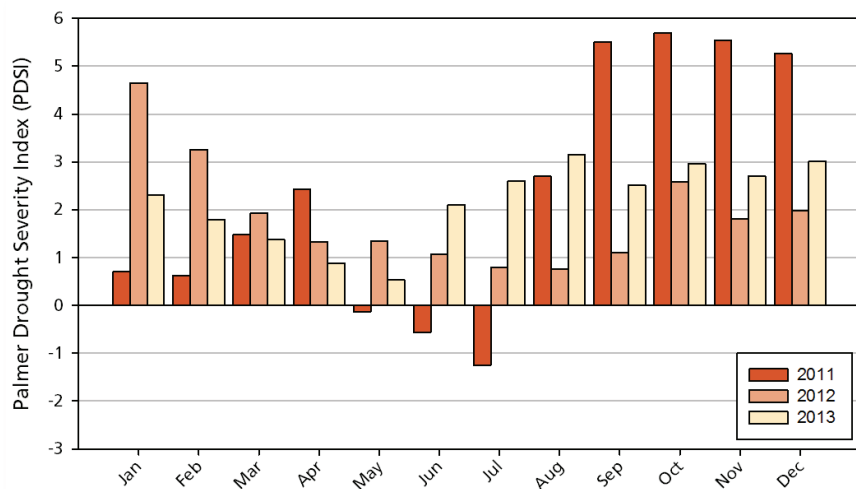
was close to average. By June, rain was far above average with 164-257 percent of normal. Overall, spring ranked as the

22nd on record in the Southeastern Piedmont. Summer received slightly above normal rainfall, but the autumn was wet, exceeding the 30-year mean by 1.8 in (46 mm) at West Chester. The occur-

rence of extreme rainfall, more than 2 in (51 mm), was well above average with five days at West Chester. The autumn ranked as the 31st wettest for the Southeastern Piedmont. The number of days with measurable snow in 2013 totaled 19 days above the average (12 days) and the occurrences of moderate and heavy snow were below normal.

Drought: 2013 was consistently moist with each month averaging above normal conditions. Monthly PDSI values in 2013 and 2012 were generally similar but conditions in 2013 were consistently drier in the winter months compared to 2011.

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



Palmer Drought Severity Index (PDSI) for the Southeastern Piedmont, 2011–2013. Positive values indicate periods of above normal precipitation (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).

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/NPS/interface.php>. This project is a collaborative effort with the Eastern Rivers and Mountains Network.



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Photos by James Comiskey (front) and Joe Nevin (below).



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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