



Hopewell Furnace National Historic Site & Valley Forge National Historical Park 2015 Status & Trends

2015 was characterized by:

- A cold winter and exceptionally warm spring and autumn; the autumn of 2015 was the warmest in 121 years of records;
- a growing season that was very close to the 30-year average;
- above-average rainfall resulting in the 15th wettest year since 1895.

In 2015, six weather observing stations were selected to report the weather of Hopewell Furnace National Historic Site and Valley Forge National Historical Park. The parks are located in the Southeastern Piedmont climate division of Pennsylvania.

Temperature: Annual average temperatures for 2015 were near to slightly above the 30-year average despite a cold winter season (January – March). Ultimately, 2015 tied as the 10th warmest year since 1895 in the Southeastern Piedmont (see table below).

The year began colder than normal with some locations having February temperatures almost 12°F (6.7°C) below long-term averages. In contrast, spring, summer, and autumn all had temperatures well above normal. In fact, the spring of 2015 ranked as the 4th warmest, and the autumn ranked as the warmest ever recorded for the Southeastern Piedmont. The maximum temperature of the year was 94.0°F (34.4°C). The

Monitoring 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.

minimum temperature of the year was -4.0°F (-20.0°C).

Because of the warm weather, the number of hot days (days with maximum temperature > 90°F (32°C)) was more than normal. The number of sub-freezing days (days with temperatures < 32°F (0°C)) was near normal. Despite the warm spring and fall, the growing season was only one day longer than average (175 days vs. an average of 174 days).

Southeastern Piedmont Climate Division Rankings (1895-2015)

	Temperature Rank 2015	Precipitation Rank 2015
Winter (Jan. – March)	116	68
Spring (April – June)	4	42
Summer (Aug. – Sept.)	11	71
Autumn (Oct. – Dec.)	1	63-T
2015 (Jan. – Dec.)	10-T	70

A ranking of 1 indicates the warmest (or wettest) period on record, and 121 represents the coldest (or driest) period. A "T" indicates that there was a tie in the rankings. Near-normal conditions would rank between 40 and 80.

Climate Rankings - 2015 had the warmest autumn on record

Weather records collected since 1895 can be used to compare current climate conditions with those of the past. To make those comparisons, climate periods (e.g. months or years) can be ranked in order from the warmest to the coldest, or the wettest to the driest. The table to the left displays these rankings over 121 years for the Southeast-

ern Piedmont climate division of Pennsylvania. The table indicates that the autumn of 2015 was the warmest ever recorded in the Southeastern Piedmont. In addition, the spring of 2015 was the 4th warmest on record. In contrast, the winter of 2015 was colder than normal. Precipitation was near normal throughout the year.



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 both Hopewell Furnace NHS and Valley Forge

NHP, multiple measures of recent temperature and precipitation metrics were “extreme” when compared to past conditions. For example, the annual average temperature and the average yearly amount of precipitation are now much greater than what occurred historically. For details, please see <http://www.nps.gov/subjects/climatechange/climateexposure.htm>.

2015 Status & Trends...

Precipitation: Overall, the year’s precipitation was slightly below long-term averages. Three of the four seasons finished with below-average precipitation, and none were in the top 40 wettest on record. Heavy precipitation days (days

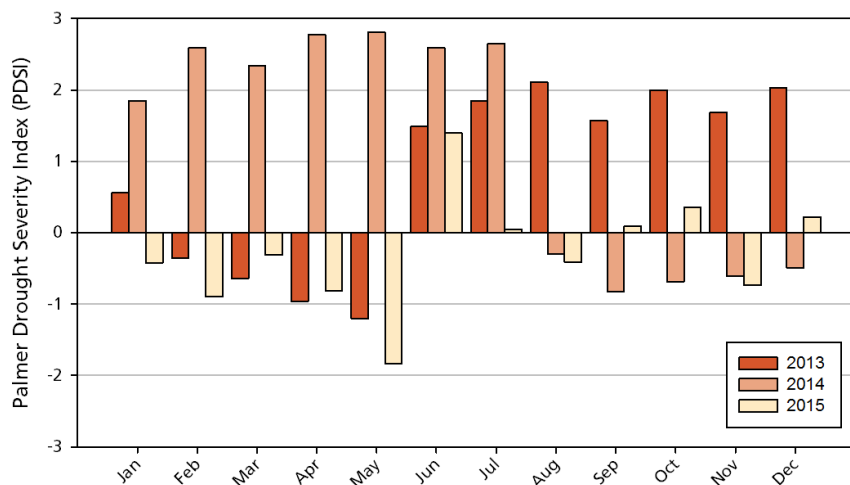
with ≥ 1 inch of rain) were below normal while micro-droughts (periods of 7+ days without rain) were slightly more common than long-term averages.

Winter precipitation was variable with a dry February and a wet March. Spring was similarly variable, with precipitation ranging from 16% of normal at some

locations in May to more than 200% of normal at other stations during June. A 19 day dry spell occurred in late summer, spanning August 22nd through September 9th. The rest of the year supported near-normal precipitation with the exception of November which was very dry (23-48% of normal precipitation). Ultimately, the year was the 70th wettest on record.

Drought: 2015 started with near-normal conditions and remained that way for the entire year (see figure to left). As summer progressed into autumn, PDSI values stabilized very close to zero (i.e. normal). Compared with prior years, 2015 was less variable and closer to normal throughout the year.

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, 2013–2015. 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).

Resource brief composed by Jeb Wofford. Photos courtesy of the National Park Service (front header) and Garen Meguerian (below).

A Final Note

The Weather and Climate Monitoring Protocol is led by Kyle Imhoff, Pennsylvania State Climatologist, and Arthur Person, research assistant, 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. The data stream can be found at: <http://climate.met.psu.edu/NPS/interface.php>. Up-to-date monthly, seasonal, and annual summaries are also available at the website. This monitoring effort is a collaborative project with the NPS Eastern Rivers and Mountains Network.



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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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