



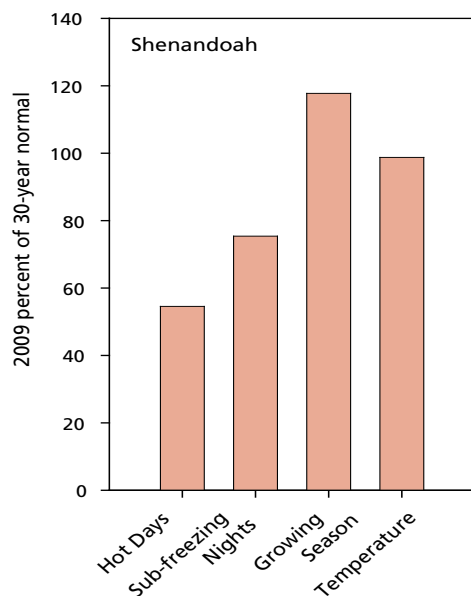
Mid-Atlantic Network

Weather & Climate Resource Brief



2009 Status & Trends

Temperature: During 2009, the differences between high and low temperatures were substantially reduced across the network compared to recent years. January was quite cold, well below the normal temperature based on the 30-



Status of 2009 temperature indicators for Shenandoah NP. Data based on averages of multiple stations.

year record (1971-2000). For example, in Eisenhower NHS and Gettysburg NMP, temperatures varied from 5.4-6.1°F below normal. In contrast, February was milder, all parks having temperatures several degrees above normal. The most distinctive season was summer which was the coolest in 115 years for most of the parks — the number of hot days and the maximum temperatures were below normal. In particular, July was very cool, though a warm August resulted in all parks having above-normal temperatures during that month. Likewise, November had above-normal temperatures, while December was below average. The number of sub-freezing nights was lower than normal (except in Southeastern Pennsylvania). Generally, the growing season started earlier than normal and ended later. For example, in Fredericksburg and Spotsylvania NMP, the growing season was three weeks longer than the 30-year average.

Objectives

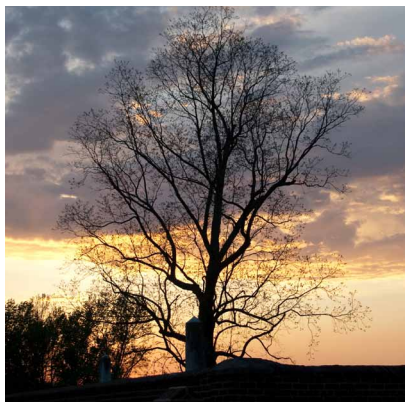
1. Document long-term trends in weather and climate through seasonal and annual summaries of selected parameters.
2. Identify and document extremes and averages of climatic conditions for common parameters, and other parameters where sufficient data are available.
3. Provide information on near real-time weather parameters, historical climate patterns, and climate station metadata from a single, easy-to-use Internet portal.

Precipitation: Annual precipitation (which includes rain and snow) was higher than the 30-year mean across the network; at Appomattox Court House NHP and Booker T. Washington NM it was 19% above normal. The number of heavy rain days (≥ 1.0 in) exceeded the long-term average. However, the year started off dry, with the winter months being the driest on record across the

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 2009 weather compares to long-term average.
- Help interpret natural resource observations in relation to 2009 weather.
- Provide a baseline for future comparisons.

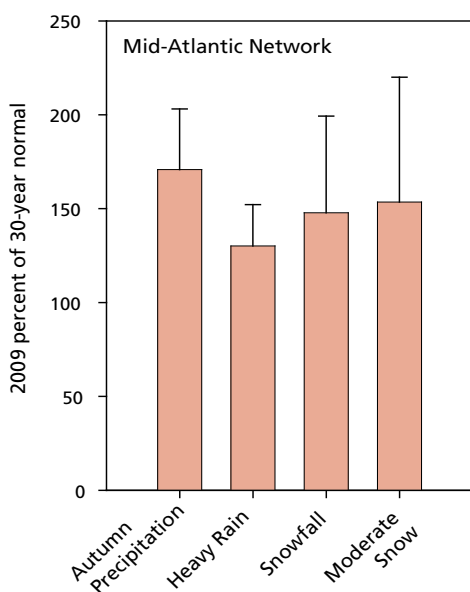
Long-term Monitoring

A total of 26 weather observing stations were selected 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 were used for comparison to a 30-year normal, while others

were used to illustrate monthly averages. Two drought indices were 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.

2009 Status & Trends.....

region. In Fredericksburg, February had 9% of the normal rain and snow. In



Status of 2009 precipitation indicators for the MIDN Parks. Data based on averages of multiple stations.

sharp contrast, spring was among the wettest on record. May was much wetter than normal for most of the network parks. For example, in Shenandoah NP, rainfall was up to 210% higher than the long-term mean. Summer rainfall was highly varied across the region, resulting in some parks having one of the wettest summers on record (Hopewell Furnace NHS and Valley Forge NHP), while others had the driest (Fredericksburg). The autumn was the wettest in recent memory for Petersburg NB, Richmond NBP, and Fredericksburg; in particular November and December were extremely wet with rainfall totaling more than 150% above normal at the majority of weather stations near the Virginia parks. In contrast, precipitation was lower in the Pennsylvania parks. Annual snowfall in 2009 was also higher in all

the parks (163% above normal), as were the number of days with heavy snow (+319%).

- For the Pennsylvania parks, 2009 had the driest winter in 115 years
- For Richmond NBP, Petersburg NB, and Fredericksburg & Spotsylvania NMP, 2009 had the wettest autumn on record

The wet summer and autumn ended drought conditions that had lasted for 27 consecutive months for most of the Virginia parks. The previous two years in the Pennsylvania parks were much wetter compared to the Virginia parks.

.....
Photos by Sarah Wakamiya, Kristina Callahan, and Nicolas Bircher. Resource brief designed by Heather Dammeyer and prepared by Stephie Burkart.

Cooperators

The Weather and Climate Monitoring Protocol is led by Paul Knight, Pennsylvania State Climatologist, and his team including Tiffany Wisniewski, 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
Jim Comiskey
Jim_Comiskey@nps.gov
Program Manager/Ecologist

Mid-Atlantic Network
120 Chatham Lane
Fredericksburg, VA 22405
www.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

April 2011