



Weather of Eisenhower National Historic Site and Gettysburg National Military Park

Mid-Atlantic Network Summary Report for 2012

Natural Resource Data Series NPS/MIDN/NRDS—2013/500



ON THE COVER

Gettysburg National Military Park.

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Weather of Eisenhower National Historic Site and Gettysburg National Military Park

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Natural Resource Data Series NPS/MIDN/NRDS—2013/500

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The National Park Service, Natural Resource Stewardship and Science office in Fort Collins, Colorado, publishes a range of reports that address natural resource topics. These reports are of interest and applicability to a broad audience in the National Park Service and others in natural resource management, including scientists, conservation and environmental constituencies, and the public.

The Natural Resource Data Series is intended for timely release of basic data sets and data summaries. Care has been taken to assure accuracy of raw data values, but a thorough analysis and interpretation of the data has not been completed. Consequently, the initial analyses of data in this report are provisional and subject to change.

All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner. This report received informal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data. Data in this report were collected and analyzed using methods based on established, peer-reviewed protocols and were analyzed and interpreted within the guidelines of the protocols.

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List of Key Acronyms

ASOS	Automated Surface Observation System
CASTNet	Clean Air Status and Trends Network
COOP	National Weather Service Cooperative Observer Program
CWOP	Citizen Weather Observer Program
EISE	Eisenhower National Historic Site
FAA	Federal Aviation Administration
GETT	Gettysburg National Military Park
IFLOWS	Integrated Flood Observing and Warning System
MIDN	Mid-Atlantic Network
NADP	National Atmospheric Deposition Program
NARR	North American Regional Reanalysis
NCDC	National Climatic Data Center
NHS	National Historic Site
NMP	National Military Park
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
PASC	Pennsylvania State Climatologist
PDSI	Palmer Drought Severity Index
POR	Period of Record
PRISM	Parameter-elevation Regressions on Independent Slopes Model
RAWS	Remote Automated Weather Stations
USDM	United States Drought Monitor
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

Introduction

Weather and climate are widely recognized as key drivers of terrestrial and aquatic ecosystems, affecting biotic as well as abiotic ecosystem characteristics and processes. Global and regional scale climatic patterns, trends, and variations are critical to the cycling of elements, nutrients, and minerals through ecosystems and can deliver pollutants from regional and even global sources (National Assessment Synthesis Team 2001). These variations and trends influence the fundamental properties of ecologic systems such as soil-water relationships and plant-soil processes and their disturbance rates and intensity. Information obtained from meteorological monitoring will be useful to interpreting and understanding changes in species composition, community structure, water and soil chemistry, and related landscape processes (Comiskey and Callahan 2008).

The purpose of this report is to provide a concise weather and climate summary for January 1 to December 31, 2012, and to place current patterns and trends in an appropriate historical, regional, and global context (Marshall et al. 2012). It is our intention that this report will satisfy an inherent interest in meteorological phenomena and meet the Mid-Atlantic Network (MIDN) Weather and Climate 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.

To accomplish this objective, a variety of atmospheric data streams were evaluated for their quality, longevity, and applicability to the MIDN parks. Since no single weather observing network contains all the pertinent measures of atmospheric phenomena to assess ecosystem health, an objective analysis of the data networks was developed and outlined in the Weather and Climate Monitoring Protocol for the Eastern Rivers and Mountains Network and Mid-Atlantic Network of the National Park Service (Marshall et al. 2012). Through this analysis, a select number of weather/climate observing stations were chosen as representative of each park; these are the primary data sources used in the profile of 2012's climate summary and trends.

In addition to a suite of summary tables, graphs, and narratives, we specifically identify a series of key weather indicators to report status and trends on an annual basis and periodically in separate and more thorough reports. These key indicators are further described in the protocol (Marshall et al. 2012) and summarized in this report.

Climate of the Lower Susquehanna

Eisenhower National Historic Site (NHS) and Gettysburg National Military Park (NMP) are located in Pennsylvania Climate Division 4, known as the “Lower Susquehanna”. A climate division is a region that is reasonably homogenous with respect to climatic and hydrologic characteristics and is frequently used for compiling climate statistics (<http://www.esrl.noaa.gov/psd/data/usclimdivs/data/map.html>). Pennsylvania is divided into ten climate divisions. The Lower Susquehanna River Valley is generally considered to have a humid continental type of climate, but the varied physiographic features have a marked effect on the weather and climate of the various parts of the valley. The prevailing westerly winds carry most of the weather disturbances that affect the region from the interior of the continent, with the Atlantic Ocean having only an occasional influence on the climate of the area (Davey et al. 2006, Gawtry and Stenger 2007). Coastal storms do, at times, affect the day-to-day weather, especially in the winter. Also, storms of tropical origin can have the greatest effect within this portion of Pennsylvania, causing severe floods in some instances (Gelber 2002).

Temperatures are moderately continental with the tempering effects of the Great Lakes contributing to some cloud production in the winter and onshore winds reducing the heat at times during the summer. The lowest readings in the winter occur with polar air masses of Canadian origin settling over the Northeast after a fresh snowfall. The highest readings of the summer happen when the sub-tropical fair weather system, the Bermuda high, pushes westward into the Carolinas; its clockwise circulation will direct hot, humid air from the Gulf region into the Susquehanna Valley. The southwest winds gain additional warmth when descending the crest of the Appalachians. The last freeze and first frost typically occur in late April and late October, respectively.

Precipitation is fairly evenly distributed throughout the year. Annual amounts generally range between 34–52 in (864–1,321 mm), while the majority of places receive 38–46 in (965–1,168 mm). Greatest amounts usually occur in the late spring and summer months, while February is the driest month, having about 2 in (51 mm) less than the wettest months. Precipitation tends to be somewhat greater in the mountains, due primarily to coastal storms which occasionally frequent the area. During the warm season these storms can bring heavy rain, while in winter heavy snow or a mixture of rain and snow may be produced.

Surface winds blow from the west and northwest in the cold season and from the southwest during the warm half of the year. Thunderstorms follow a frequency that matches the solar cycle, occurring between the equinoxes and reaching a peak near the solstice. Hail is relatively infrequent, but flash floods and damaging thunderstorm winds affect parts of the Valley each summer. On average, tornadoes pass through the area about once every three years. The direct effects of an Atlantic hurricane are uncommon, though remnant rains from tropical storms have contributed to the region’s worst floods. Ice storms, which can cause significant disruption, occur at irregular intervals, but are primarily confined to the months between December and March (Kocin and Uccellini 2004).

Observing Stations

A total of two weather observing stations comprised of two weather observing networks were selected around Eisenhower NHS and Gettysburg NMP (Figure 1). Representative stations within a 100-km range of each park were chosen based on several criteria, which include proximity to the parks, the representativeness of the station to the park elevation profile, the type and frequency of observations, the period of record of the data, and data availability (Marshall et al. 2012). Moreover, the percentage of time a station reports a particular parameter (e.g., temperature) can influence data inclusion. A total of two stations were ultimately used for this 2012 report: Arendtsville and Biglerville (Table 1, Figure 1).

The average value of a climate element over 30 years is defined as a climatological normal, which are is calculated and established by NOAA's National Climatic Data Center (NCDC). Every ten years, NCDC computes new thirty-year climate normals for selected temperature and precipitation elements for a large number of U.S. climate and weather stations. The current (as of 2011) normals cover the period 1981–2010. In this report, the 30-year normals established by NCDC are used as the baseline for comparisons (e.g., departures from normal). In cases where data for the 30-year normal period are not available, we use alternative comparisons such as the new pseudo-normals from NCDC or a recent 10-year period. In some cases, sufficient data may simply not be available to calculate normals. For metrics that NCDC may not routinely calculate a normal, such as the number of days with more than 2 in (55 mm) of rain or liquid equivalent, normals are calculated using the same time period (e.g., 1981–2010) as the current NCDC standard. Throughout the report, descriptions of a station's values as compared to the normals are described as a difference from the "average", "mean", "typical", "long-term value", as well as "normal", to improve the readability of the document. However, all of these terms are comparing a value from one year at that station to that station's normal, whether it be the 30-year normal or the pseudo-normal calculated on a shorter time frame

Of the two stations, only Biglerville has a Period of Record (POR) sufficiently long for a 30-year normal (1981–2010). However, for Arendtsville a normal was calculated based on a POR from 1988–2010. Monthly averages and deviations from normal are presented for all stations for precipitation and temperature.

In addition to the summary information available in this report, a near real-time data stream has been made available to the MIDN through a Web interface for the selected weather observing stations, along with monthly, seasonal, and annual summaries. The Web interface is accessible through the following link:

http://climate.met.psu.edu/gmaps/NPS_DEVELOPMENT/interface.php.

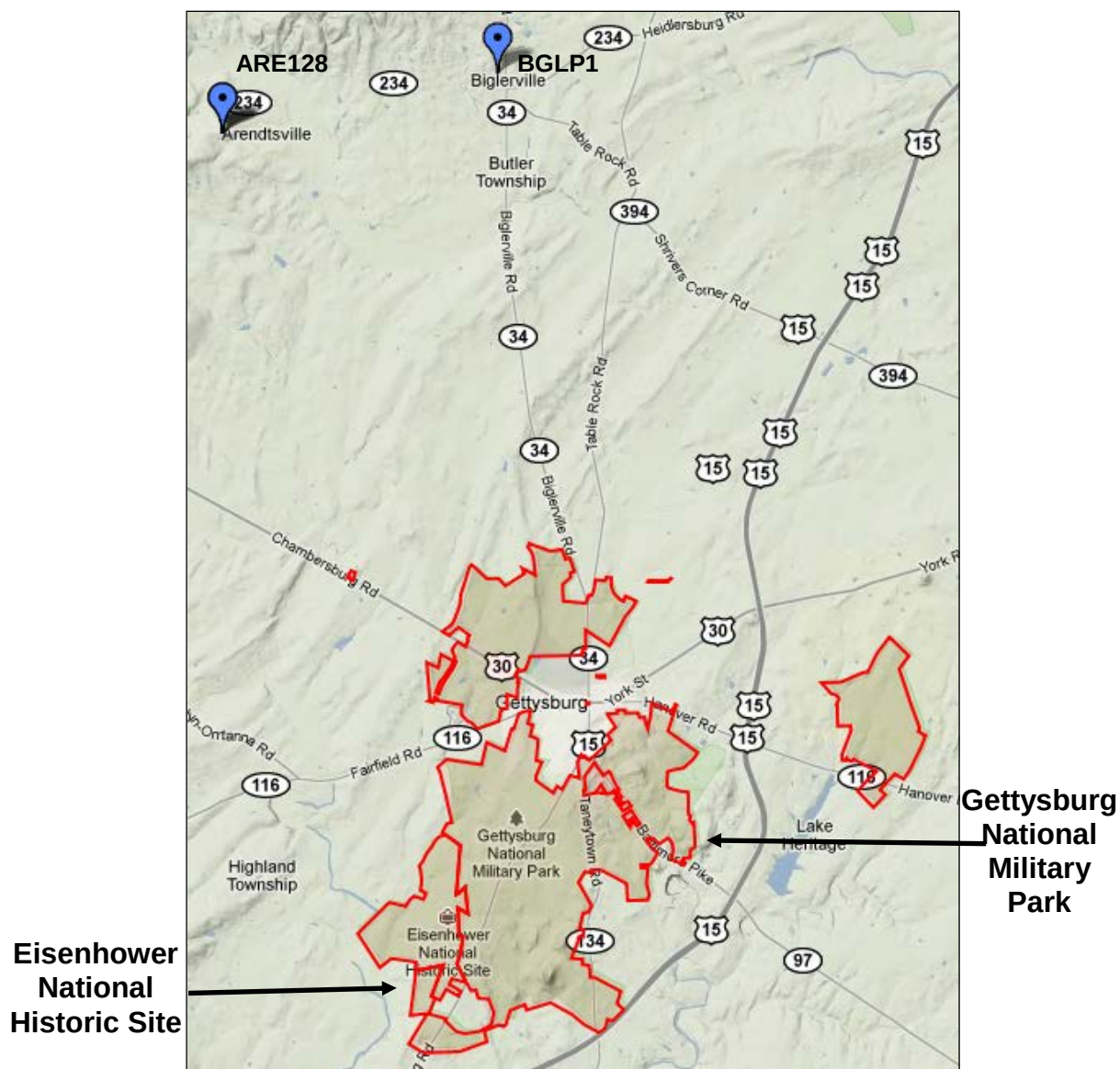


Figure 1. Location of weather observing stations around Eisenhower National Historic Site and Gettysburg National Military Park selected as most representative of the parks in 2012. See Table 1 for station names.

Table 1. List of weather observing stations around Eisenhower NHS and Gettysburg NMP selected as most representative of the parks in 2012.

Station	Observing Network ¹	Name	Period of Record (POR)		Percentage of time reporting temperature for 2012	Percentage of time reporting precipitation for 2012	Percentage of time reporting temperature for entire POR	Percentage of time reporting precipitation for entire POR
ARE128	CASTNET	Arendtsville	07/01/1988	Present	98.4	200	96.1	94.5
BGLP1	COOP	Biglerville	02/02/1972	Present	100.0	91.8	99.9	99.6

¹ Observing networks are: CASTNet — Clean Air Status and Trends Network, COOP — National Weather Service Cooperative Observer Program.

Temperature Summary

With the exception of November, temperatures were consistently above normal during 2012 for the areas around Eisenhower NHS and Gettysburg NMP (Figures 2 and 3)¹. The annual maximum temperature was 2.5°F (1.4°C) above normal and the annual minimum was 3.0°F (1.7°C) above normal, resulting in a mean increase of 2.7°F (1.5°C) compared with the 1981-2010 average annual temperature (Table 2).

The year began rather chilly with the lowest reading of 8°F (-13.3°C) on January 4th, which is above the normal value of -2.5°F (-19.2°C) (Table 2), but temperatures then rebounded averaging between 3.5°F to 4.3°F (1.9°C to 2.4°C) above the long-term normal (Tables 3 and 4). Despite the frigid start in early January, February turned even milder with readings around 5.8°F (3.2°C) above average (Table 4). The mild trend reached a peak in March, which averaged as much as 10.3°F (5.7°C) above the long-term average (Table 4) making it the warmest March on record. The number of cold days was below normal in 2012 (Table 2). The winter temperatures, based on the Lower Susquehanna climate division, ranked 1st, the warmest in 118 years of records (Table 5).

Spring saw temperatures a bit closer to seasonal levels with April averaging 0.5°F to 1.6°F (0.3°C to 0.9°C) above the long-term mean (Table 4). May continued to be milder than normal based on warm days and nights (Figure 3). Average conditions returned in June with monthly mean temperatures near 70.0°F (21.1°C) (Table 3). As a result of the persistent warmth, spring 2012 ranked as the 19th warmest on record for the Lower Susquehanna (Table 5).

The summer was not as warm as previous years; it was ranked as the 70th warmest in 118 years (Table 5). July started very warm, with mean temperatures as much as 3.9°F (2.2°C) above the normal (Table 4). As a result, the highest readings of the year, 100°F (37.8°C), rose several degrees above the usual summer maximum. The number of days with maximum temperatures reaching 90°F (32.2°C) tallied 23, compared with a normal of 17 days (Table 2). August was cooler, but readings still averaged between 0.2°F to 0.3°F (0.1°C to 0.2°C) above the normal temperatures (Table 4). September was virtually normal, though there were some cool nights (Figure 3).

Autumn featured a tepid October and a very chilly November and a warm December (Figures 2 and 3). The season's first freeze occurred on October 13th and the number of sub-freezing days was 99, which is near the long-term mean of 113 days (Table 2). A combination of mild nights and very warm days in December kept the monthly mean temperatures well above normal (Table 4). November was dominated by numerous days below normal (24 of 31 days) (Figure 2), which kept the mean temperatures 2.8°F (1.6°C) below normal (Table 4). Autumn ranked as the 31st warmest due to the very mild December (Table 5). The growing season in 2012 was about two weeks longer than the 30-year average (Table 2).

¹ The maps in Figures 2 and 3 were created using estimates from the Parameter-elevation Regressions on Independent Slopes Model (PRISM). PRISM uses an interpolation scheme for temperature between actual observations and corrects these estimates for changes in topography across the region (Daly et al. 2002). More information is at <http://www.prism.oregonstate.edu/>.

Eisenhower National Historic Site
and Gettysburg National Military Park
Departure from Average Monthly Maximum Temperature
2012 vs. 1981–2010

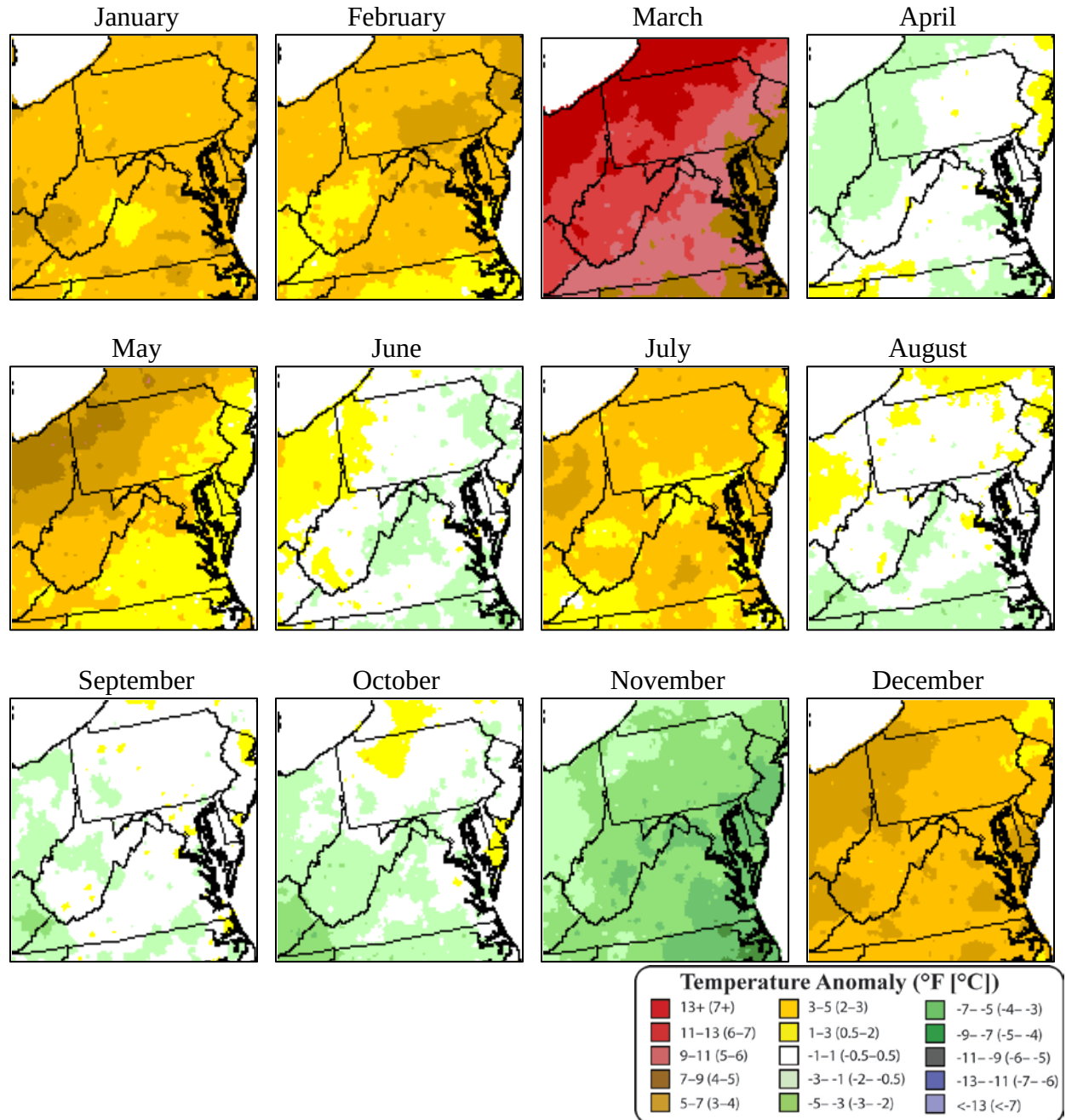


Figure 2. Maps showing departure from average monthly maximum temperature compared to the 30-year normal (1981–2010).

Eisenhower National Historic Site
and Gettysburg National Military Park
Departure from Average Monthly Minimum Temperature
2012 vs. 1981–2010

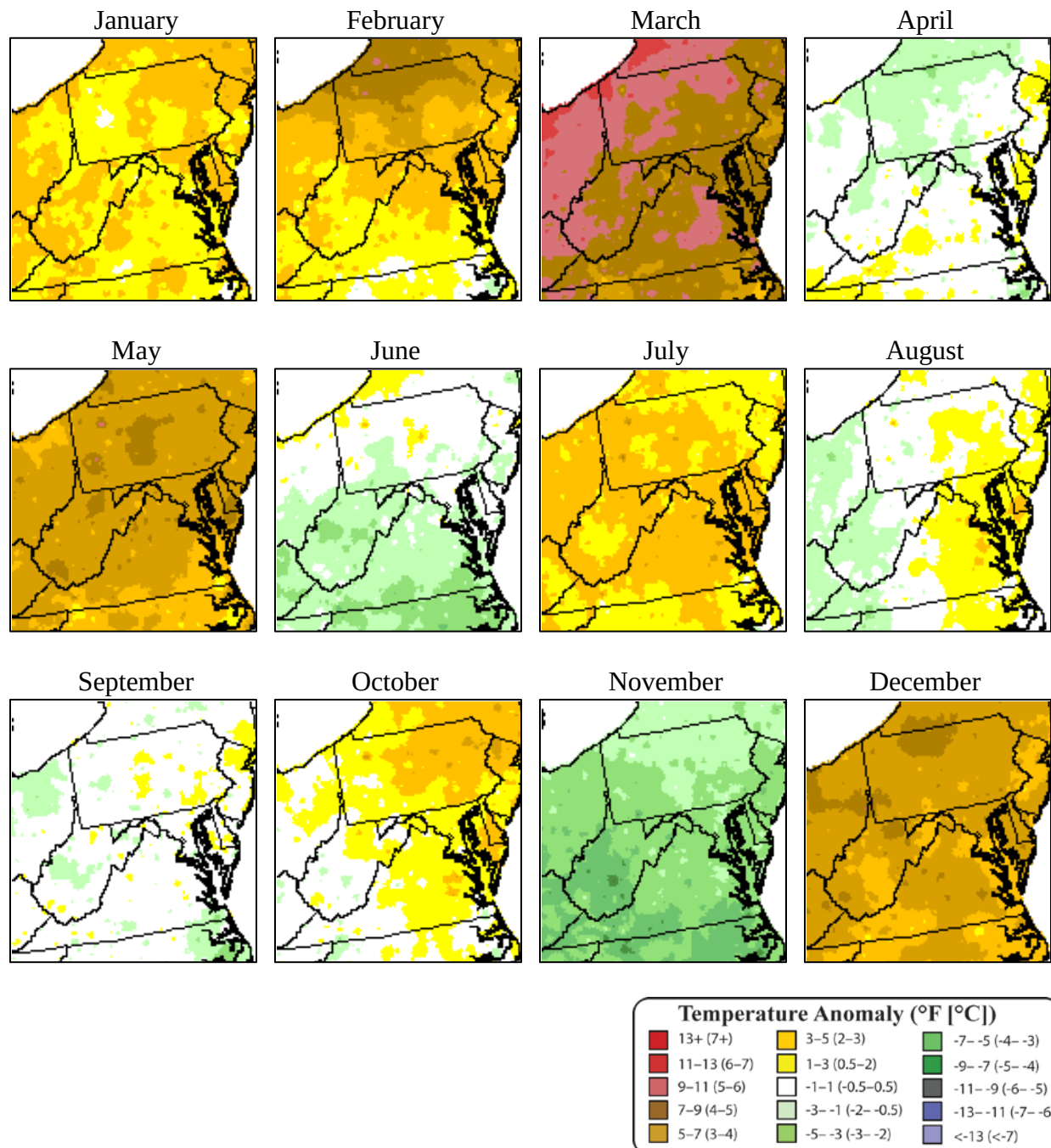


Figure 3. Maps showing departure from average monthly minimum temperature compared to the 30-year normal (1981–2010).

Table 2. Status of 2012 temperature indicators compared to the 30-year normal (1981–2010) at the Biglerville (BGLP1) weather observing station.

Temperature Indicator	Biglerville, PA 2012	Biglerville, PA 1981–2010
Average Annual Temperature	55.0°F 12.8°C	52.3°F 11.3°C
Average Annual Maximum Temperature	64.9°F 18.2°C	62.3°F 16.8°C
Maximum Temperature	100.0°F 37.8°C	97.5°F 36.4°C
Hot Days (days with Tmax≥90°F/32°C)	23	17
Average Annual Minimum Temperature	45.3°F 7.4°C	42.3°F 5.7°C
Winter Minimum (lowest temperature)	8.0°F -13.3°C	-2.5°F -19.2°C
Cold Days (days with Tmax≤32°F/0°F)	8	21
Sub-freezing Days (days with Tmin≤32°F/0°C)	99	113
Sub-zero Days (days with Tmin≤-0°F/-18°C)	0	1
Growing Season Length (days between last spring Tmin 32°F/0°C and first fall Tmin 32°F/0°C)	196	180

Table 3. Summary of 2012 monthly average temperatures for selected stations.

Station name	Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Biglerville	BGLP1	33.5°F	37.6°F	50.1°F	52.2°F	66.1°F	70.0°F	77.8°F	73.5°F	65.5°F	54.3°F	40.9°F	38.9°F	55.0°F
		0.8°C	3.1°C	10.1°C	11.2°C	18.9°C	21.1°C	25.4°C	23.1°C	18.6°C	12.4°C	4.9°C	3.8°C	12.8°C
Arendstville	ARE128	34.6°F	37.9°F	50.9°F	52.5°F	66.1°F	70.1°F	76.8°F	72.5°F	64.2°F	54.0°F	41.5°F	39.2°F	55.0°F
		1.2°C	3.3°C	10.5°C	11.4°C	19.0°C	21.4°C	24.9°C	22.5°C	17.9°C	12.2°C	5.3°C	4.0°C	12.8°C

M = missing data (Monthly statistics are reported as ' M ' if more than 4 days of data are missing).

Table 4. Summary of 2012 departure from normal temperature based on 30-year normal (1981–2010) for selected stations.

Station name	Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Biglerville	BGLP1	4.3°F	5.8°F	10.3°F	1.6°F	5.2°F	- 0.3°F	3.9°F	0.2°F	0.3°F	0.7°F	- 2.8°F	6.5°F	2.6°F
		2.4°C	3.2°C	5.7°C	0.9°C	2.9°C	- 0.1°C	2.2°C	0.1°C	0.2°C	0.4°C	-1.6°C	3.6°C	1.5°C
Arendstville ¹	ARE128	3.5°F	5.0°F	10.0°F	0.5°F	4.4°F	0.4°F	3.0°F	0.3°F	- 0.8°F	- 0.9°F	- 3.1°F	5.1°F	2.3°F
		1.9°C	2.7°C	6.2°C	0.3°C	2.4°C	0.2°C	2.1°C	0.2°C	- 0.4°C	- 0.5°C	- 1.7°C	2.8°C	1.3°C

¹Indicates a station's Period of Record is five or more years but less than 30 years. In these cases, the departures from normal values were calculated with normals derived from data spanning the length of the station's Period of Record.

Table 5. Seasonal and annual temperature and precipitation rankings for 2012 over 118 years for the Lower Susquehanna (NOAA 2011).

	Climate Division 4 Rankings — Lower Susquehanna				
	Jan–Feb–Mar WINTER	Apr–May–Jun SPRING	Jul–Aug–Sep SUMMER	Oct–Nov–Dec AUTUMN	Jan–Dec YEAR
Temperature – 2012	T-1	T-19	T-70	31	4
Precipitation – 2012	103	43	9	43	27

1 = warmest/wettest year and 118 = coldest/driest year. T = Tie between two years.

Precipitation Summary

The year ending on December 31, 2012, was the 27th wettest on record for Eisenhower NHS and Gettysburg NMP (Figure 4, Table 5 and 6). It started with the 16th driest winter in 118 years, with each of the next three seasons wetter than usual for the Lower Susquehanna (Table 5). It was a year evenly divided with five months above and below average and two with normal precipitation.

While January averaged near normal precipitation (105-115 percent), February and March averaged well below-normal precipitation. In fact, February brought only 0.9 in (22 mm) of precipitation to Biglerville, which is a mere 30 percent of normal (Tables 8 and 9). None of the wettest/snowiest days of 2012 occurred during the winter season (Table 7). March continued to be dry, with 60 percent of normal rain and snowfall in Biglerville and 89 percent of normal in Arendtsville. With the generally dry conditions, there were two strings of seven days or more without measurable rain or snow from January 4-11 and March 13-19 (Table 7).

April was the 33rd driest on record for the Lower Susquehanna region, but then May turned much wetter (Figure 4). The end of this three-month period had only 54 percent of normal rainfall (Table 9). The maximum monthly precipitation total during the spring was tallied at Biglerville in May with 5.3 in (135 mm). Remarkably, June, which was rather dry, had one of the top five wettest days in 2012 with 1.61in (41 mm) on June 13th (Table 7).

Both July and September had above-average rainfall, with 4.4 in (113 mm) in July and 4.1 in (105 mm) during September (Table 8). There was no direct contribution to rainfall from tropical storms or hurricanes during this period. A total of 3.2 in (81 mm) was tallied at Arendtsville in August (Table 8). One dry spell occurred during this summer. The period from September 11-17 had no measurable rain (Table 7). This season ranked as the 9th wettest in 118 years for the Lower Susquehanna (Table 5), though most of the rain was in other parts of the climate division.

Once again, autumn had an above-average amount with 11.0 in (278 mm) of rain and snow falling compared with 10.3 in (262 mm) (Table 6). October had below average rainfall until the end of the month when the direct effects of Hurricane Sandy were felt. The wettest day in 2012 occurred on October 30th when 3.42 in (87 mm) fell, but since it had been quite dry beforehand, flooding was minimal. The longest dry spell of the year occurred during the autumn with the period from November 14-26 reporting no measurable rain or snow (Table 7). Snowfall tallied 18.9 in (48 cm), which was below the long-term average. There were only 7 days with measurable snow, compared with 11 days in a typical year (Table 6). There were 10 days when more than 1 in (25.4 mm) of rain was measured during 2012 (Table 6). The autumn ranked a bit wetter than normal, 42nd wettest in 118 years of record keeping (Table 5) and the annual precipitation total was 6.2 in (157 mm) below the 30-year average from 1981–2010 (Table 6).

Eisenhower National Historic Site
and Gettysburg National Military Park
Percent of Average Monthly Precipitation
2012 vs. 1981–2010

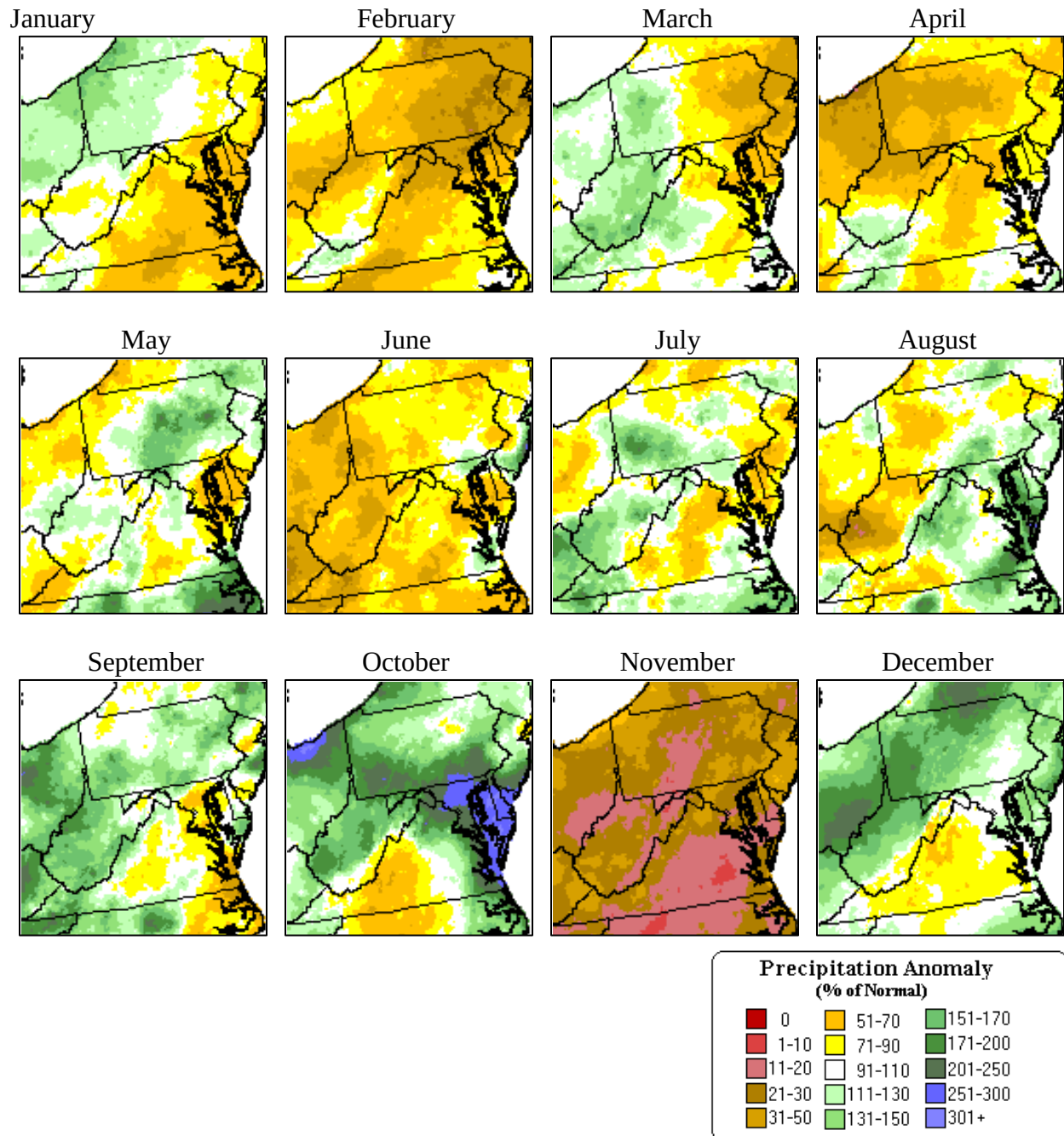


Figure 4. Maps showing percent of average monthly precipitation compared to the 30-year normal (1981–2010).

Table 6. Status of 2012 precipitation indicators compared to the 30-year normal (1981–2010) at the Biglerville (BGLP1) weather observing station.

Precipitation indicator	Biglerville, PA 2012	Biglerville, PA 1981–2010
Annual Precipitation	37.1 in* 942 mm	43.3 in 1,100 mm
Autumn (Oct, Nov, Dec) Precipitation	11.0 in 278 mm	10.3 in 262 mm
Heavy Precipitation Days (days with ≥ 1.0 in (25 mm) rain)	10	11
Extreme Precipitation Days (days with ≥ 2.0 in (51 mm) rain)	1	2
Micro-drought (strings of 7+ days without rain)	5	9
Annual Snowfall	18.9 in 48.0 cm	25.9 in 65.8 cm
Measurable Snow Days (days with ≥ 0.1 in (0.3 cm) snow)	7	11
Moderate Snow Days (days with ≥ 3.0 in (7.6 cm) snow)	4	3
Heavy Snow Days (days with ≥ 5.0 in (12.7 cm) snow)	0	1

* Two months had missing data (May and September)

Table 7. Top five wettest days and top five dry spells (consecutive days with a trace or less of liquid precipitation) during 2012 from the weather observing station at Biglerville (BGLP1).

Wettest Days in 2012	Dry Spells in 2012
October 30: 3.42 in (87 mm) ¹	Nov 14-26
September 19: 2.19 in (56 mm)	Jan 4-11
July 20: 1.78 in (45 mm)	Apr 5-12
December 21: 1.76 in (44 mm)	Mar 13-19
June 13: 1.61 in (41 mm)	Sept 11-17

¹ Hurricane Sandy

Table 8. Summary of 2012 monthly total precipitation for selected stations.

Station name	Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Biglerville	BGLP1	3.3 in	0.9 in	2.1 in	0.6 in	5.3 in*	2.1 in	4.4 in	3.2 in	4.1 in*	6.3 in	0.9 in	3.8 in	37.0 in
		84 mm	22 mm	54 mm	15 mm	135 mm	54 mm	113 mm	81 mm	105 mm	160 mm	22 mm	96 mm	701 mm
Arendstville	ARE128	3.5 in	1.1 in	4.4 in	2.3 in	5.0 in	3.7 in	4.8 in	3.1 in	6.2 in	6.8 in	1.0 in	4.8 in	46.6 in
		89 mm	28 mm	112 mm	57 mm	128 mm	94 mm	122 mm	79 mm	158 mm	173 mm	26 mm	120 mm	1185 mm

* As many as 7 missing days

Table 9. Summary of 2012 percent of normal precipitation based on the 30-year normal (1981–2010) for selected stations.

Station name	Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Biglerville	BGLP1	105	30	60	17	165	54	126	91	115	182	25	114	88
Arendstville ¹	ARE128	115	36	89	42	112	76	232	72	125	171	30	147	98

¹Indicates a station's Period of Record does not cover the period of 1981-2010 but is five years or more. In these cases, the departures from normal values were calculated with normals derived from data spanning the length of the station's Period of Record.

Drought Status

There are a number of drought indices used to estimate the severity of drought in an area using algorithms that incorporate recent temperatures, rainfall, soil moisture, and other information (<http://www.drought.gov>). The main indices we report are the Palmer Drought Severity Index (PDSI) and the United States Drought Monitor (DM) – Drought Intensity Index. While both indices provide excellent summary information on broad-scale conditions, local conditions (such as at the park scale) may vary.

The PDSI is a soil moisture algorithm calibrated for relatively homogeneous regions and is calculated on a monthly basis using precipitation and temperature data, as well as the water content of the soil. The values vary between extremely moist (>4.0) and extreme drought (<-4.0) with “normal” values ranging between -1.9 and 1.9 . The long-term average is “zero”. Monthly PDSI values for the Lower Susquehanna in 2012 are shown in Figure 5.

The DM – Drought Intensity Index is a synthesis of multiple indices (including the PDSI) and impacts, which represents a consensus of federal and academic scientists (NIDIS 2011). The DM produces a summary map of drought intensity for the nation and all states each week. It is on a scale ranging from abnormally dry (D0) to exceptional drought (D4). Mid-month (i.e., the second or third week) values for Pennsylvania (Figure 6) and the Northeast (Figure 7) are shown for 2012.

According to the PDSI, 2012 was moist throughout with values exceeding very moist conditions in January and October (above 3.0); however, regular rain became infrequent in April so the region returned to near normal (values near $+1$) during this time (Figures 5). When compared with the last two years, 2012 was noticeably wetter during the growing season, especially in the spring and had the longest continuous period of above average moist conditions of the last three years.

The DM – Drought Severity Index for Pennsylvania (Figure 6) and the Northeast (Figure 7) shows a pattern similar to the PDSI for the growing season (May through October); with mid May and July being the closest to the long-term average.

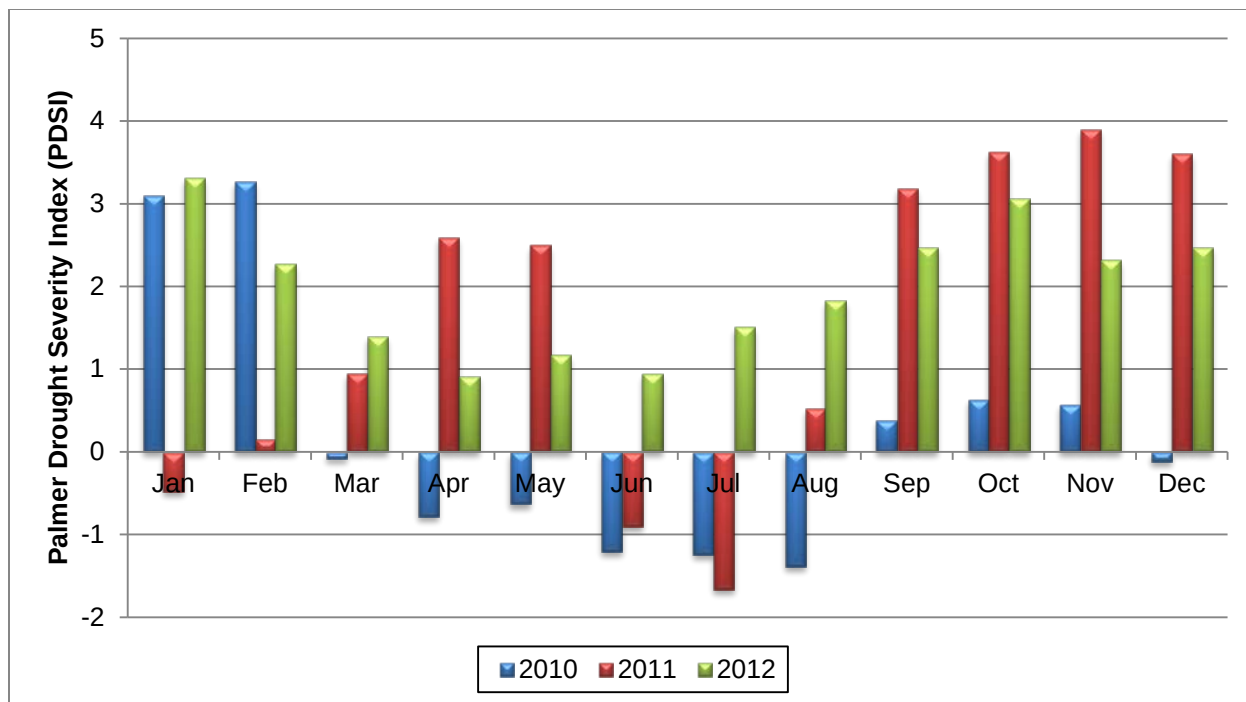


Figure 5. Palmer Drought Severity Index (PDSI) for the Lower Susquehanna, 2010–2012.

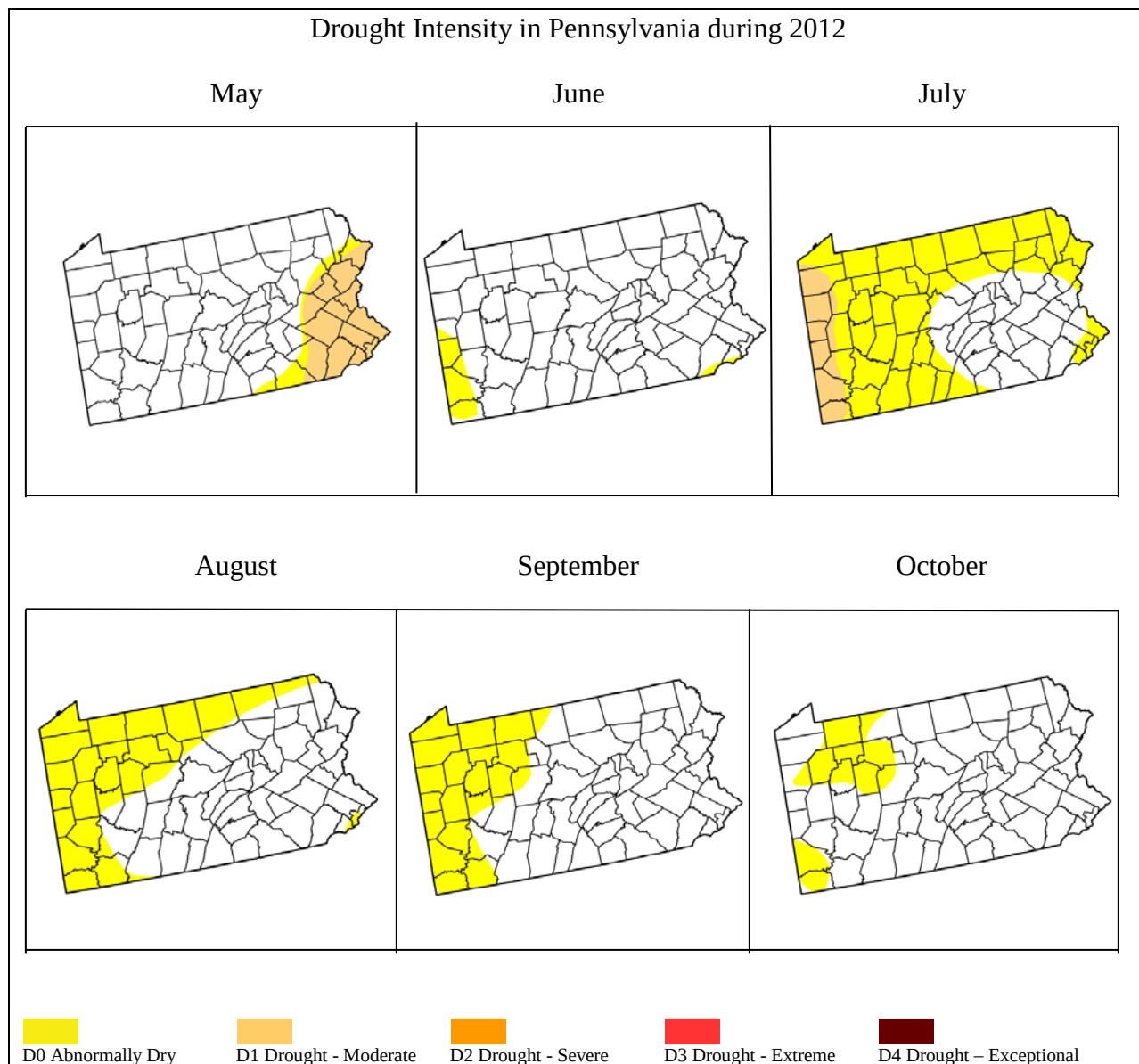


Figure 6. Mid-month values of the United States Drought Monitor (DM) – Drought Intensity Index for Pennsylvania in 2012.

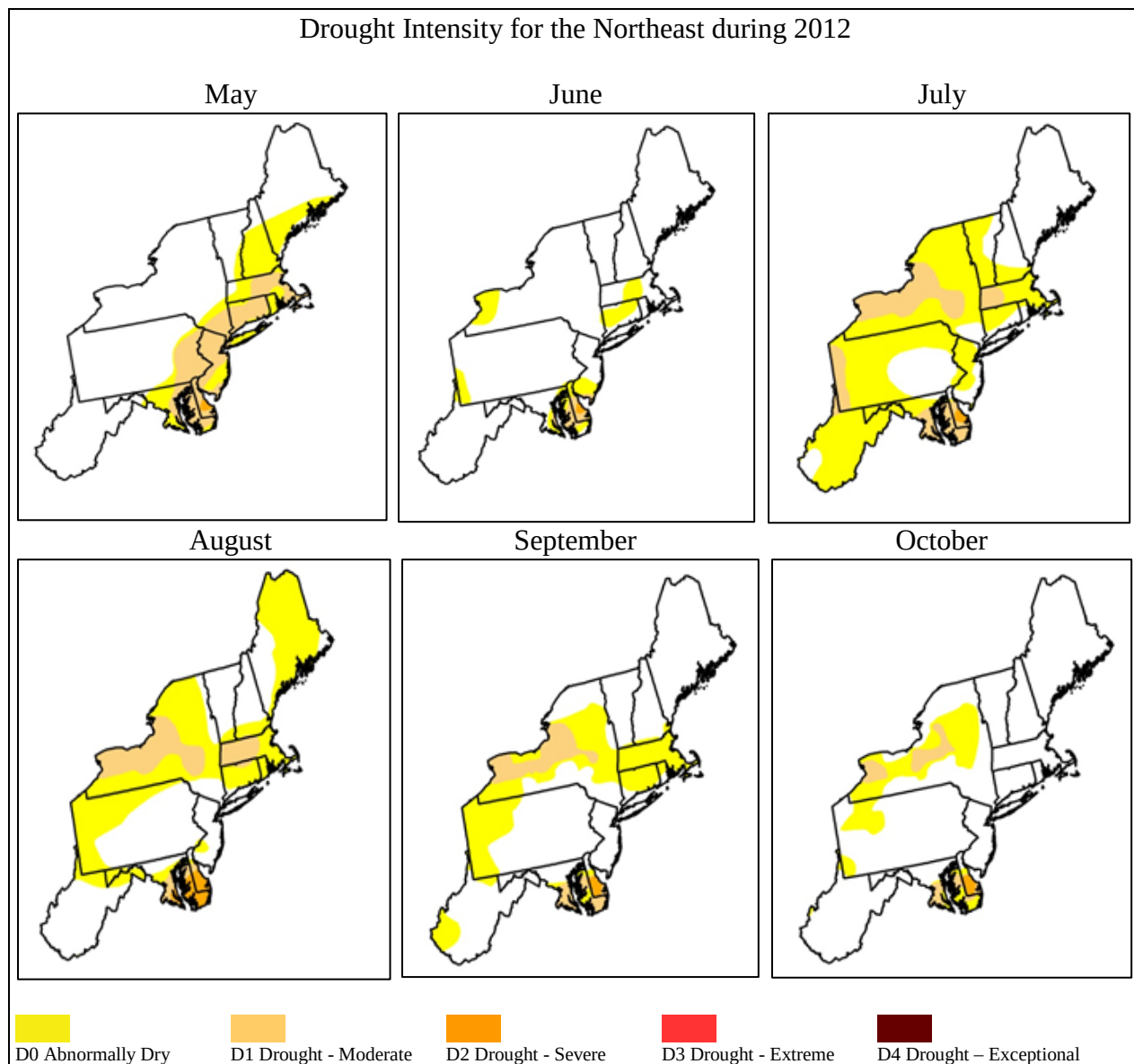


Figure 7. Mid-month values of the United States Drought Monitor (DM) – Drought Intensity Index for the Northeast in 2012.

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