

## **Drought**

### **General**

Drought can be broadly defined as a time period of prolonged dryness that contributes to the depletion of ground and surface water. There are three types of drought. A meteorological drought is a deficiency in moisture in the atmosphere. This will have very little effect on the crops and water supply, depending on the preceding conditions. An agricultural drought inhibits the growth of crops, because of a moisture deficiency in the soil. This type of drought, if persistent, can lead to the third type of drought, which is a hydrologic drought. This drought is basically a prolonged period of time without rainfall. A hydrologic drought can have adverse affects on agriculture, streams, lakes, and ground water levels. Leaving areas with little moisture, droughts are often one of the leading contributing factors to wildfires.

### **History**

Data collected from several disparate sources shows that Huntingdon County experienced several periods of drought conditions over the last few decades. The Pennsylvania Emergency Management Agency (PEMA) maintains data on all state and federally declared disasters affecting the Commonwealth. A review of PEMA’s disaster history indicates that Huntingdon County has experienced five declared drought events from 1963 through 2007. Two of the five recorded droughts were severe. The drought in September 1963 required a Presidential Declaration of Major Disaster. The drought in November 1980 was categorized as a drought emergency by gubernatorial proclamation.

According to the Pennsylvania Department of Environmental Protection (PA DEP), between 1980 and 2007, Huntingdon County was under a drought watch 23 times, a drought warning 12 times, and a drought emergency 8 times. As of January, 2008, Huntingdon County’s drought status was normal.

**Huntingdon County Drought Status History (1980-2007)**

<b>Date</b>	<b>Drought Status</b>	<b>Date</b>	<b>Drought Status</b>
November 18, 1980 – April 20, 1982	Emergency	December 3, 1998 – December 8, 1998	Watch
April 26, 1982 – July 20, 1985	Watch	December 8, 1998 – December 14, 1998	Watch
July 29, 1985 – October 22, 1985	Watch	December 14, 1998 – December 16, 1998	Warning
October 22, 1985 – October 29, 1985	Watch	December 16, 1998 – January 15, 1999	Watch
October 29, 1985 – November 19, 1985	Watch	January 15, 1999 – March 15, 1999	Warning
July 7, 1988 – August 24, 1988	Watch	March 15, 1999 – June 10, 1999	Watch
August 24, 1988 – December 12, 1988	Warning	June 10, 1999 – June 18, 1999	Warning
March 3, 1989 – May 15, 1989	Watch	June 18, 1999 – July 20, 1999	Warning
June 28, 1991 – July 24, 1991	Warning	July 20, 1999 – September 30, 1999	Emergency
July 24, 1991 – August 16, 1991	Emergency	September 30, 1999 – December 16, 1999	Warning
August 16, 1991 – September 13, 1991	Emergency	December 16, 1999 – February 25, 2000	Watch
September 13, 1991 – October 21, 1991	Emergency	February 25, 2000 – May 5, 2000	Watch

<b>Huntingdon County Drought Status History (1980-2007) cont.</b>					
Date		Drought Status	Date		Drought Status
October 21, 1991	– January 16, 1992	Emergency	August 8, 2001	– August 24, 2001	Watch
January 17, 1992	– April 20, 1992	Emergency	August 24, 2001	– November 6, 2001	Watch
April 20, 1992	– June 23, 1992	Warning	November 6, 2001	– December 5, 2001	Watch
June 23, 1992	– September 11, 1992	Warning	December 5, 2001	– February 12, 2002	Warning
September 11, 1992	– January 15, 1993	Watch	February 12, 2002	– May 13, 2002	Emergency
September 1, 1995	– September 20, 1995	Warning	August 9, 2002	– November 5, 2002	Watch
September 20, 1995	– November 8, 1995	Warning	November 5, 2002	– November 7, 2002	Watch
November 8, 1995	– December 18, 1995	Watch	April 11, 2006	– June 30, 2006	Watch
July 17, 1997	– October 27, 1997	Watch	August 8, 2007	– September 5, 2007	Watch
October 27, 1997	– November 13, 1997	Watch			

**Source:** PA Department of Environmental Protection, Watershed Management Drought Information Center

A further examination of drought data obtained from the National Climatic Data Center (NCDC) between January 1, 1950 and December 29, 2005, shows that Huntingdon County experienced six recorded drought events. While this data differs slightly from records maintained by PEMA, there is some correlation, specifically in relation to the drought of July-August 1999. While the PEMA data more accurately reflects *declared* drought disasters in the Commonwealth, the NCDC data provides an indication of the *impact* these events had on Huntingdon County in terms of the effect on residents, property, and economic vitality. While none of these events resulted in injury or loss of life to County residents, or caused significant property damage to any County structures, the drought of July 1999 did result in an estimated \$500 million in damage to crops among 35 affected counties in the Commonwealth, including Huntingdon.

<b>Huntingdon County Drought Event History</b>			
Date	Time	Type	Magnitude
08/01/1995	0	Drought	N/A
09/01/1995	0	Drought	N/A
10/31/1997	8:00 AM	Drought	N/A
12/15/1998	12:01 AM	Drought	N/A
07/01/1999	12:00 AM	Drought	N/A
08/01/1999	12:01 AM	Drought	N/A

**Source:** National Climatic Data Center (NCDC)

The data obtained by the NCDC also provides a more detailed understanding of the existing weather conditions and impact to the County for the six recorded drought events.

The drought of August 1995 affected 18 counties in the Commonwealth, including Huntingdon. There were 15 days during the month when the high temperature was 90 degrees or more. This was greater than any other August on record in the region. High temperatures were above 90 degrees from August 13-20. The average daily temperature during this period never fell below 80 degrees. The average high temperature for the month was 89.1 degrees and the

average low was 66.4 degrees, giving an average mean temperature of 77.7 degrees, 7.2 degrees above normal. In comparison, the hottest August on record had a mean temperature of 78.7 degrees in 1900. August 1995 ranked as the fifth hottest month since records began in 1871. The heat and lack of rainfall dried up ponds on farms used for irrigation and livestock. Rainfall amounts for August were 1.4 to 2.9 inches below normal. Dry weather took a toll on regional agriculture, with crop yields estimated to be off by 30 to 50 percent in some locations.

The drought of September 1995 was a continuation from August 1995, another warm and dry month across central Pennsylvania. While some areas in the state received heavy rain toward the end of the month, rainfall amounts for September were well below average. Rainfall was 1.4 to 2.4 inches below average, causing drought watches and warnings to be issued for much of central Pennsylvania in early September. In some areas, a drought emergency was issued by late month.

The drought of October 1997 affected several counties in Pennsylvania, including Huntingdon. In all, 46 counties and their contiguous neighbors were declared agricultural disaster areas by the U.S. Department of Agriculture. Eventually, farmers in all Pennsylvania counties became eligible for disaster relief. Much of the rain that did fall in neighboring counties during the flash flood of September 11<sup>th</sup> was too late to be beneficial to crops.

The drought of December 1998 affected 25 counties in Pennsylvania, including Huntingdon. Abnormally dry conditions through the fall months developed into drought across central Pennsylvania by mid-December. Governor Tom Ridge declared drought emergency conditions in nine central Pennsylvania counties, with drought warnings in others, necessitating restrictions on water use up to 15 percent. Precipitation departures from normal for the four months leading up to the declaration totaled more than eight inches in a number of locations, with nearly all areas in deficit by more than four inches. Bans were placed on outdoor burning, as numerous woodland and brush fires occurred across the region.

The drought of July 1999 affected 33 counties in Pennsylvania, including Huntingdon. Governor Ridge declared a drought emergency in 55 of the 67 counties in Pennsylvania, following extended dry weather conditions through much of the summer. Precipitation deficits for many counties for the months of May through July 1999 averaged between five and seven inches. Precipitation departures for the 365-day period ending in mid-July were over one foot below normal in many places. This is about one-third of total annual normal precipitation. Streams were empty, wells dried up, and the Susquehanna River hit record low levels. Hot sunny days combined with the dry weather took a large toll on crops. Preliminary estimates by the U.S. Department of Agriculture indicated crop losses in excess of \$500 million. The figure did not include a 20 percent decrease in milk production due to the drought; this resulted in additional significant losses. There were some counties that experienced 70 to 100 percent crop losses. At least 30 percent losses are needed for a drought disaster declaration.

The drought of August 1999 was a continuation of July's drought. A drought emergency remained in effect for 55 of the 67 counties in Pennsylvania. In spite of the severe flash flooding in a few locations, and normal or above-normal precipitation in many others, water tables remained low and water usage was restricted.

*"In March, water levels at Raystown Lake were almost 12 feet below normal. Along edges of the lake, where calm water should shimmer in the sunlight, mud flats stretch 100 yards wide, strewn with skeleton-like tree stumps and car-sized boulders."*

*-Penn Lines, April 2002, Vol. 37 No. 4*

**Vulnerability**

Drought vulnerability depends on the duration and area of impact. However, other factors contribute to the severity of a drought. Unseasonably high temperatures, prolonged winds, and low humidity can heighten the impact of a drought.

The effects of a drought include:

- a depletion of consumable water supply;
- a depletion of agricultural water supply;
- a depletion of forest water and water used to fight forest fires;
- a depletion of water for navigational and recreational purposes;
- a depletion of water for natural irrigation (besides crops and forests); and
- poor water quality.

**Huntingdon County**

Droughts can have adverse effects on farms and other water-dependent industries, often resulting in local economic loss. Public safety is an issue in terms of the unavailability of consumable water, as well as water for fire protection and emergency services.

Drought preparation includes three phases: drought watch, drought warning, and drought emergency.

<b>Drought Preparation Phases</b>				
	<b>General Activity</b>	<b>Actions</b>	<b>Request</b>	<b>Goal</b>
Drought Watch	Early stages of planning and alert for drought possibility	Increased water monitoring, awareness, and preparation for response among government agencies, public water suppliers, water users, and the public	Voluntary water conservation	Reduce water use by 5%
Drought Warning	Coordinate a response to imminent drought conditions and potential water shortages	Reduce shortages, relieve stressed sources, develop new sources if needed	Continue voluntary water conservation, impose mandatory water use restrictions if needed	Reduce water use by 10-15%
Drought Emergency	Management of operations to regulate all available resources and respond to emergency	Support essential and high priority water uses and avoid unnecessary uses	Possible restrictions on all nonessential water users	Reduce water use by 15%

*Source: PA Department of Environmental Protection*

Data collected by the Pennsylvania Department of Environmental Protection (DEP) on the Commonwealth's declared drought status indicates that from November 6, 1980 to the present, Huntingdon County experienced 40 occasions where the County's declared drought status was above the normal level. During this period, the County was placed on a drought watch 18 times, a drought warning 13 times, and a drought emergency nine times.

### **Probability**

The probability of a drought occurring in Huntingdon County is quite high. Droughts historically occur every five years or less in the County. While droughts occur often, their impacts depend on the duration of the event and the area of impact.

### **Maximum Threat**

Farms and rural areas often face the greatest risk associated with droughts. However, Huntingdon County's greatest risk may be associated with the portion of the economy that hinges on the tourism attraction of Raystown Lake. A drought affecting Raystown Lake, such as the one which occurred in March 2002, can significantly affect the economy of Huntingdon County. Raystown Lake generates an estimated \$40 million annually.

### **Secondary Effect**

Wildfire is the most severe secondary effect associated with drought. Wildfires can devastate wooded areas, agriculture areas, threatening natural resources and farm production facilities. Prolonged drought conditions can cause major ecological changes, such as increases in scrub growth, flash flooding, and soil erosion.

Long-term water shortages can have a high impact on agribusiness, hydropower-dependent public utilities, and other industries reliant on water for production services. Drought can cause municipalities to enforce water rationing and distribution. This strains the availability of consumable water for the community. It also increases Huntingdon County's vulnerability to other hazards, such as severe weather, extreme heat, and public health emergencies. The special needs population of any county also must be considered during drought conditions.