

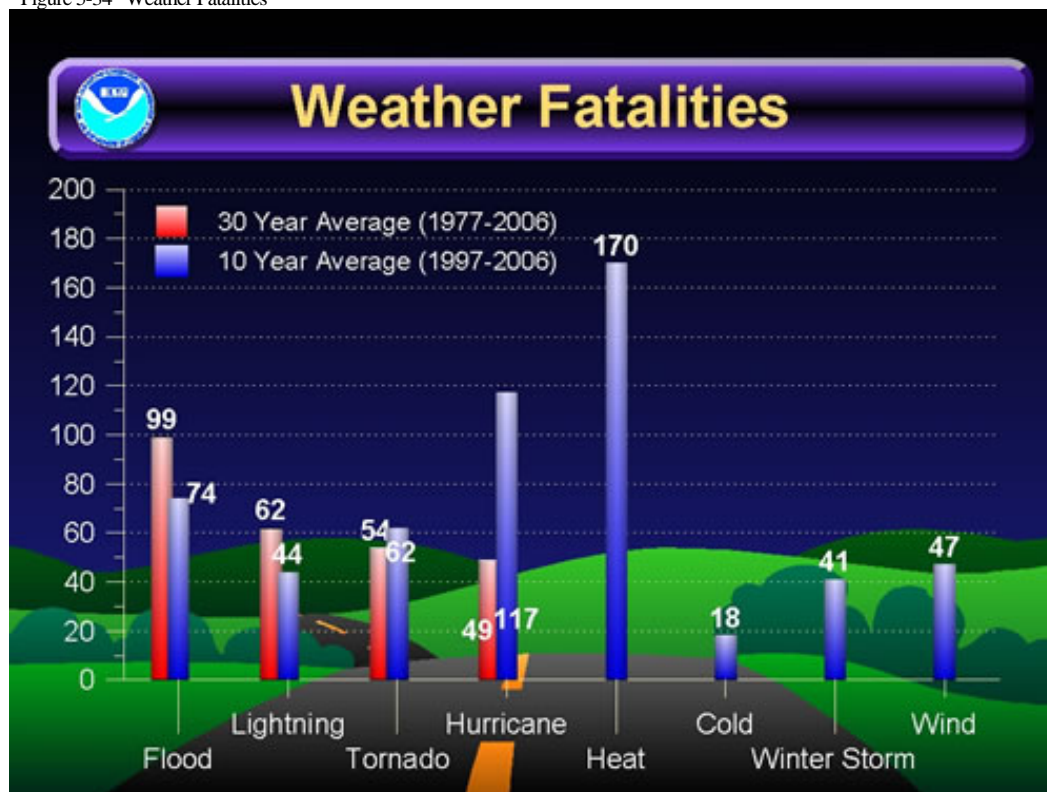
Hazard Profile - Extreme Heat

Description

Extreme Heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Humid and muggy conditions which add to the discomfort of high temperatures, occur when a “dome” of high atmospheric pressure traps hazy, damp air near the ground. Excessive dry and hot conditions can occasionally provoke dust storms and low visibility. Droughts occur when a long period passes without substantial rain. A heat wave combined with a drought creates a very dangerous situation. The National Weather Service has a system in place to initiate alert procedures (advisories or warnings) when the Heat Index (HI) is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued.

There is no information available for heat related fatalities in the study area. In terms of New York State, from 1994 – 2006 there have been 86 fatalities as a result of extreme heat. 79 of the 86 fatalities took place in a period of 7 years, ranging from 1999 – 2006 as shown in Figure 5-36.

Figure 5-34 Weather Fatalities



Source: National Weather Service.
New York State Hazard Mitigation Plan

Location and Extent

The entire study area is susceptible to extreme heat conditions. The severity of such an event is a function of duration, intensity and the impact of extreme heat on public utilities, especially electricity and public water supplies.

Previous Occurrences

The NOAA /NCDC Storm event database contains information on extreme temperature events beginning in 1950 up through the summer of 2008. For these type events, the database indicates that six (6) have occurred in areas including the New York Metropolitan area (Southern Westchester) which includes the Town/Village of Harrison since October 1993. Table 5-76 provides a summary of this data.

Table: 5-48 Summary of Extreme Temperature Events

Location or County	Date	Time	Type	Death	Injury	Property Damage
<u>Areawide</u>	10/08/1993	0000	Record Heat	0	0	0
<u>NYZ067>081</u>	07/04/1999	01:00 PM	Excessive Heat	33	0	0
<u>NYZ067>078 - 080</u>	08/08/2001	04:00 PM	Excessive Heat	4	1	0
<u>NYZ067>081</u>	07/02/2002	12:00 PM	Excessive Heat	0	0	0
<u>NYZ067>081</u>	07/29/2002	12:00 PM	Excessive Heat	0	0	0
<u>NYZ067>081</u>	08/01/2006	11:00 AM	Excessive Heat	42	0	0

Source: NOAA-NCDC <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>

Note: No deaths, injuries or property damage are documented for the study area.

The Westchester County Airport is partially located in the northeast corner of the study area. Information provided by the MyForecast website for the airport indicates that the average high temperature for July is 84 degrees with a recorded high of 107 degrees. The number of days in July where the temperature exceeds 90 degrees was reported as 6.

There have been several instances in recent years where temperatures have exceed the 10 degree threshold above the high average temperature for periods of several days rather than several weeks. Locally, these type events are also considered extreme heat situations and at times have created the same type situations of the longer period occurring events.

Probability of Future Events

The study area is likely to experience extreme heat in the future. Based on historical records and the experience of members of the HMPC, the probability for such events is frequent (likely to occur more than once every 5 years).

Vulnerability Assessment

The entire study area is susceptible to Extreme Heat. The most rigorously documented impacts are health related based on studies conducted by the U.S. Center for Disease Control and Prevention. The study areas elderly population age 65 and over (approximately 3,870 people) may be severely impacted by prolonged events.

Overview of vulnerability

Historical information for the study area clearly indicates extreme heat is a concern. Periods of extreme heat where temperatures are 10 degrees above the average high for several days can clearly have impacts in such areas as health (especially the elderly), transportation, energy, and water resources. Extreme heat situations can have a cascading affect which can lead to drought restrictions being implemented during an intense or prolonged event.

Data and methodology

Data with respect to past extreme heat events was provided by the NOAA – NCDC and information gathered from websites which record temperatures at the Westchester County Airport located in the northeast corner of the study area. HAZUS-MH does not provide any extreme heat related information in its software programs.

Impact on life, safety and health

According to the Cooperative Institute for Research in the Atmosphere, located at Colorado State University in Fort Collins Colorado, on average over the last 30 years, excessive heat accounts for more reported deaths annually than hurricanes, floods, tornadoes, and lightning combined. Heat kills by taxing the human body beyond its abilities. Heat disorders generally have to do with a reduction or collapse of the body's ability to shed heat by circulatory changes and sweating or a chemical (salt) imbalance caused by too much sweating. When heat gain exceeds the level the body can remove, or when the body cannot compensate for fluids and salt lost through perspiration, the temperature of the body's inner core begins to rise and heat-related illness may develop. Elderly persons, small children, chronic invalids, those on certain medications or drugs, and persons with weight and alcohol problems are particularly susceptible to heat reactions, especially during heat waves in areas where moderate climate usually prevails. Table 5-77 illustrates the relationship of temperature and humidity to heat disorders.

The NWS has in place a system to initiate alert procedures (advisories or warnings) when the Heat Index is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. A common guideline for the issuance

of excessive heat alerts is when the maximum daytime high is expected to equal or exceed 105°F and a nighttime minimum high of 80°F or above is expected for two or more consecutive days.

The Heat Index (HI), created by the National Weather Service is a chart which accurately measures apparent temperature of the air as it increases with the relative humidity. The Heat Index can be used to determine what effects the temperature and humidity can have on the population. Table 5-78 describes the adverse effects that prolonged exposures can have on individuals. To determine the Heat Index, you need the temperature and the relative humidity. Once both values are known, the Heat Index will be the corresponding number with both values. That number provides how it really feels. It is important to know that the Heat Index (HI) values are devised for shady, light wind conditions. Exposure to full sunshine can increase HI values by up to 15 degrees. Also, strong winds, particularly with very hot, dry-air can be extremely hazardous to individuals.

Table 5-49 Accurate measurement of temperature during an extreme heat event

		Temperature (°F)															
		80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
Relative Humidity (%)	40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
	45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
	50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
	55	81	84	86	89	93	97	101	106	112	117	124	130	137			
	60	82	84	88	91	95	100	105	110	116	123	129	137				
	65	82	85	89	93	98	103	108	114	121	128	136					
	70	83	86	90	95	100	105	112	119	126	134						
	75	84	88	92	97	103	109	116	124	132							
	80	84	89	94	100	106	113	121	129								
	85	85	90	96	102	110	117	126	135								
	90	86	91	98	105	113	122	131									
	95	86	93	100	108	117	127										
	100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

 Caution
 Extreme Caution
 Danger
 Extreme Danger

Source: National Weather Service
New York State Hazard Mitigation Plan

Table 5-50 Explanation of Heat Related Disorders

Category	Heat Index	Health Hazards
Extreme Danger	130°F - Higher	Heat Stroke/ Sunstroke is likely with continued exposure.
Danger	105°F - 129°F	Sunstroke, muscle cramps, and/or heat exhaustion possible with prolonged exposure and /or physical activity.
Extreme Caution	90°F - 105°F	Sunstroke, muscle cramps, and/or heat exhaustion possible with prolonged exposure and /or physical activity.
Caution	80°F - 90°F	Fatigue possible with prolonged exposure and/or physical activity.

Source: NYSEMO HMP

The National Weather Service (NWS) provides alerts when Heat Indices approach hazardous levels. Table 5-79 provides the alert procedures for the National Weather Service. In the event of an extreme heat advisory, The National Weather Service does the following:

- Include HI values and city forecasts;
- Issue special weather statements including who is most at risk, safety rules for reducing risk, and the extent of the hazard and HI values;
- Provide assistance to State/Local health officials in preparing Civil Emergency Messages in severe heat waves.

Table: 5-51 National Weather Service Alert Procedures

Product	Criteria
Heat Advisory (NYC)	The NWS issues a Heat Advisory within 24 hours of the onset of the following conditions: Heat Index of at least 100°F but less than 105°F for any period of time, or when nighttime lows are above 80°F for any period of time. (Note: This weather product was modified for New York City. The national definition places the heat index requirement at 105°F).
Excessive Heat Watch	The NWS issues an Excessive Heat Watch within 24 to 48 hours of the onset of the following conditions: Heat Index of at least 105°F for more than 3 hours per day for 2 consecutive days, or a Heat Index of at least 115°F for any period of time.
Excessive Heat Warning	The NWS issues an Excessive Heat Warning within 24 hours of the onset of the following conditions: Heat Index of at least 105°F for more than 3 hours per day for 2 consecutive days, or a Heat Index of more than 115°F for any time period.

Source: NYC Heat Emergency Plan
New York State Hazard Mitigation Plan

Identifying structures including general building stock, critical facilities and critical infrastructure

Typically the only impact extreme heat has on general building stock and critical facilities is increased demand on air conditioning equipment which in turn may cause strain on electrical systems. Public utility infrastructure such as electrical generating and conveyance systems may become damaged and breakdown causing either localized or widespread power outages. Under these situations, it is important that critical infrastructure have backup electrical generating systems in order to maintain critical functions and services. At times, transportation systems, especially the highway network has been impacted by extreme heat events. Concrete pavements have experienced “blowouts or heaves” both on local highway and the higher volume parkway and interstate systems. Blowouts occur when pavements expand and can not function properly within their allotted spaces. Pavement sections may rise up several inches during such events. These conditions can cause motor vehicle accidents in their initial stages and can shut down traffic lanes or roadways entirely until such times as the conditions are mitigated.

Economic impact

HAZUS-MH does not provide an analysis of the economic impact to the study area as a result of extreme heat. Data for an analysis for the study area is not locally available.

Addressing Repetitive Loss Properties (NFIP data for floods, other hazards as available)

The National Flood Insurance Program provides information on payments to homeowners resulting from losses due to flooding. Under the extreme heat hazard event category, repetitive loss properties are not analyzed.

Estimating Potential Losses

HAZUS-MH does not provide an analysis of structural vulnerability to building stock, critical facilities or infrastructure. Extreme heat may impact buildings by placing increased strain on mechanical systems providing air conditioning and electrical power. Potential loss data is not available locally.

Analyzing Development Trends (new buildings, critical facilities and Infrastructure)

Section 4 of this plan Municipal Profile – Future Development identifies several areas in the Town / Village of Harrison where the potential for development or redevelopment exists. As of January 1, 2009, construction underway is limited due to the economic turndown. Structures, critical facilities and infrastructure would not be severely impacted by extreme heat. Extreme heat has been known to lead to other problems such as power failures. Critical facilities should have provisions for on site power generation with automatic switching capabilities should a power outage occur. Landscaped areas may suffer due to a decrease in the availability of water from prolonged extreme heat conditions. Landscape designs which have the ability to retain water utilizing ponds, rain gardens and other absorbing features would prove beneficial in the event of a drought.

Additional Data and Next Steps

The Cooperative Institute for Research in the Atmosphere, located at Colorado State University in Fort Collins Colorado suggests that the total impacts of temperature extremes are not fully documented and known. Much of the documentation of temperature impacts combines other meteorological events and uses climatological scales of space and time. The nature of seasonal impacts is more cumulative and complex than the impacts of heat waves. Yet the impacts are measurable. Weather forecasting must take into account the hazards and impacts of temperature extremes to provide useful, understandable and timely information to reduce the impacts of extreme heat events.

Overall vulnerability conclusion

Based on information provided by NOAA-NCDC, local summer weather records and the experience of the HMPC, Extreme Heat has been determined to be a frequent event in the study area and thus a medium risk event.