

# EXTREME HEAT

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## Hazard Description

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Severe, excessive summer heat is characterized by a combination of exceptionally high temperatures and humidity. When these conditions persist over a period of time, it is called a heat wave.

Although heat can damage buildings and facilities, it presents a more significant threat to the safety and welfare of citizens. The major human risks associated with severe summer heat include: heat cramps; sunburn; dehydration; fatigue; heat exhaustion; and even heat stroke. The most vulnerable population to heat casualties are children and the elderly or infirmed, who frequently live on low fixed incomes and cannot afford to run air-conditioning on a regular basis. This population is sometimes isolated, with no immediate family or friends to look out for their well being.



Severe summer heat is an invisible killer. Although a heat wave does not happen with the spectacle of other hazards such as tornadoes and floods, the National Center for Environmental Health reports that from 1979 to 1999, excessive heat exposure caused 8,015 deaths in the United States. In other words, during this period, more people in the U.S. died from severe summer heat than from hurricanes, lightning, tornadoes, and floods combined.

## Location

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Though injuries or deaths from extreme heat have been recorded at different locations throughout the region, there is no specific geographic scope to the extreme heat hazard. Extreme heat could occur anywhere in the planning area.

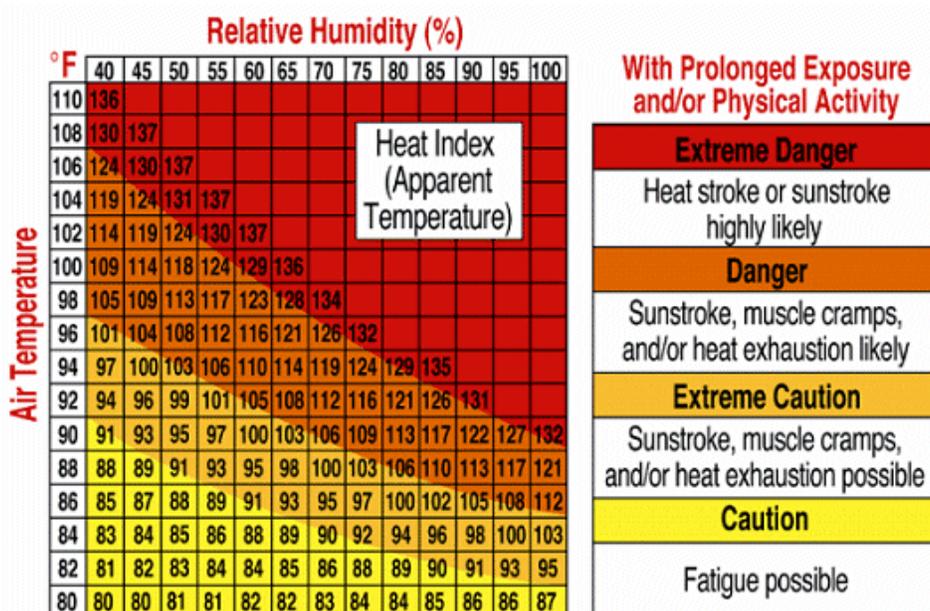
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## Extent

Higher than normal humidity and temperatures can cause an extreme heat event or heat wave to occur. A heat wave is a prolonged period of excessive heat most often in very humid conditions.

The magnitude or intensity of an extreme heat event is measured according to temperature in relation to the percentage of humidity. According to the National Oceanic Atmospheric Administration (NOAA), this relationship is referred to as the “Heat Index,” and is depicted in Figure 11-1. This index measures how hot it feels outside when humidity is combined with high temperatures.

**Figure 11-1. Extent Scales for Extreme Summer Heat**



The extent scale in Figure 11-1 displays varying degrees of caution depending on the relative humidity combined with the temperature. For example, when the temperature is at 90 degrees Fahrenheit or lower, caution should be exercised if the humidity level is at or above 40 percent.

The shaded zones on the chart indicate varying symptoms or disorders that could occur depending on the magnitude or intensity of the event. “Caution” is the first level of intensity where fatigue due to heat exposure is possible. “Extreme Caution” indicates that sunstroke, muscle cramps or heat exhaustion are possible, whereas a “Danger” level means that these symptoms are likely. “Extreme Danger” indicates that heat stroke is likely.

The National Weather Service (NWS) initiates alerts based on the Heat Index as shown Table 11-1.

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**Table 11-1. Extreme Summer Heat Warnings**

INTENSITY	DETAILED DESCRIPTION
Heat Advisory	Extreme heat index making it feel hot, typically between 105 °F to 110 °F (41 °C to 43 °C) for 3 hours or more during the day and at or above 75 °F (24 °C) at night.
Excessive Heat Warning	Extreme heat index making it feel very hot, typically above 105 °F (41 °C) for 3 hours or more during the day and at or above 80 °F (27 °C) at night.

Source: National Weather Service

Based on the extent scale in Figure 11-1 an extreme summer heat event could occur with an air temperature as low as 80°F if the percentage of humidity was equal to or greater than 40 percent. Even though this temperature seems relatively low, given the high humidity, fatigue is possible. Citizens, especially children and the elderly should exercise caution by staying out of the heat for prolonged periods at this temperature and relative humidity. As the chart indicates fatigue is only possible, but can occur with prolonged exposure or physical activity. Citizens who work outdoors should exercise caution even at the lower temperature if the humidity is at a high degree. With prolonged exposure or physical activity fatigue could set in, causing dizziness, headaches or nausea.

All communities the GBRA planning area are equally susceptible to extreme heat events; however coastal counties and those near the coast, including Victoria, Refugio and Calhoun, may experience higher humidity along with heat resulting in a higher heat index. Therefore among the GBRA communities, those closest to the coast can expect to mitigate an extent where sunstroke, muscle cramps and heat exhaustion or an extent of “Extreme Caution”. Although all areas in the GBRA planning area may experience extreme heat, due to their location on or near the coast, Victoria, Refugio and Calhoun counties can expect to mitigate for heat exhaustion or sunstroke. This also coincides with previous occurrence data, as record heat waves have been recorded for Victoria and Refugio. All other communities within the planning are should mitigate to an extent of “Caution” as fatigue is possible during summer months.

Because the GBRA region is affected seasonally by extreme summer heat, the extent scales provide a means for better targeting mitigation actions to protect lives. For example, it is important to note that fatigue, sunstroke and even heat stroke are possible even when the temperature is not at peak high. Using the extent scale in Figure 11-1 to combine heat and humidity allows officials to better predict events and more accurately warn citizens of danger.

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## Historical Occurrences

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In other parts of the country and the world, severe summer heat hazards have had devastating consequences. For instance, in 1995 a two-week-long heat wave hit Chicago and the heat index peaked at 119 degrees Fahrenheit. There were 465 deaths directly attributable to the heat wave and more than half of the victims were 75 years of age or older.

According to the National Climatic Data Center, from 1999 to 2009 two heat events affected counties in the planning area: Victoria and Refugio. In September of 2000 a stagnant high pressure light winds and below normal rainfall allowed temperatures to remain above 100 °F; Victoria County remained above 109°F in the first 5 days of September. No deaths or property damage was reported. In May of 2006 very hot and humid conditions developed in South Texas including Victoria and Refugio Counties. On May 10, 2006 heat indices reached 115 to 125°F. No deaths or property damage was reported. While no deaths were reported for these two events, such devastation is possible and has occurred state wide. Table 11-2 below summarizes heat event related deaths in Texas for the last 10 years.

**Table 11-2. Extreme Heat related deaths in Texas**

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Texas	11	32	21	1	none reported	4	1	6	3	5	13

Source: NCDC

## Probability of Future Events

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The likelihood or future probability of occurrence of excessive summer heat in the GBRA region is occasional, with an event possible in the next five years. Extreme drought conditions and above-average temperatures for 2009 have affected all of the participating jurisdictions' probability of experiencing an extreme heat event; secondary impacts as well. In the past, multiple counties throughout the region have issued burn bans to prevent the occurrence of wildfires due to extreme heat and dry conditions.

## Impact and Vulnerability

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The potential impact of excessive summer heat is minor, resulting in few, if any, injuries. There is only minor property damage and minimal disruption to the quality of life. Any shutdown of facilities is temporary.

There is no defined geographic boundary for excessive summer heat events. While all of the planning area is exposed to extreme temperatures, existing buildings, infrastructure, and critical facilities are not

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considered vulnerable to significant damage caused by extreme heat events. Therefore, any estimated property losses associated with these hazards are anticipated to be minimal across the area. However, extreme temperatures do present significant life and safety threats to the population of the GBRA region. As a result, excessive summer heat deserves mitigation consideration by the participating jurisdictions.