DROUGHT

Hazard Description

Drought is a period of time without substantial rainfall that persists from one year to the next. Drought is a normal part of virtually all climatic regions, including areas with high and low average rainfall. Drought is the consequence of anticipated natural precipitation reduction over an extended period of time, usually a season or more in length. Droughts can be classified as meteorological, hydrologic, agricultural, and socioeconomic. Table 13-1 presents definitions for these different types of drought.

Droughts are one of the most complex of all natural hazards, as it is difficult to determine their precise beginning or end. In addition, droughts can lead to other hazards, such as extreme heat and wildfires. Their impact on wildlife and area farming is enormous, often killing crops, grazing land, edible plants and even in severe cases, trees. A secondary hazard to drought is wildfire because dying vegetation serves as a prime ignition source. Therefore, a heat wave combined with a drought is a very dangerous situation.

Table 13-1. Drought Classification Definitions[1]

METEOROLOGICAL DROUGHT	The degree of dryness or departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales.
HYDROLOGIC DROUGHT	The effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
AGRICULTURAL DROUGHT	Soil moisture deficiencies relative to water demands of plant life, usually crops.

[1] Source: Multi-Hazard Identification and Risk Assessment: A Cornerstone of the National Mitigation Strategy, FEMA

SOCIOECONOMIC DROUGHT	The effect of demands for water exceeding the supply as a result of a weather-related supply shortfall.

Location

Droughts occur regularly throughout Texas and the CVCOG Region and are a normal condition. However, droughts can vary greatly in their intensity and duration. There is no distinct geographic boundary to drought; therefore, the CVCOG Region is equally at risk.

Extent

The Palmer Drought Index is used to measure the extent of drought by measuring the duration and intensity of long-term drought-inducing circulation patterns. Long-term drought is cumulative, with the intensity of drought during the current month dependent upon the current weather patterns plus the cumulative patterns of previous months. The hydrological impacts of drought (e.g., reservoir levels, groundwater levels, etc.) take longer to develop. Table 13-2 depicts magnitude of drought while Table 13-3 describes the classification descriptions.

Table 13-2. Palmer Drought Index

DROUGHT INDEX	DROUGHT CONDITION CLASSIFICATIONS						
	Extreme	Severe	Moderate	Normal	Moderately moist	Very moist	Extremely moist
Z Index	-2.75 and below	-2.00 to -2.74	-1.25 to -1.99	-1.24 to +.99	+1.00 to +2.49	+2.50 to +3.49	n/a
Meteorological	-4.00 and below	-3.00 to -3.99	-2.00 to -2.99	-1.99 to +1.99	+2.00 to +2.99	+3.00 to +3.99	+4.00 and above
Hydrological	-4.00 and below	-3.00 to -3.99	-2.00 to -2.99	-1.99 to +1.99	+2.00 to +2.99	+3.00 to +3.99	+4.00 and above

Table 13-3. Palmer Drought Category Descriptions[2]

CATEGORY	DESCRIPTION	POSSIBLE IMPACTS	PALMER DROUGHT INDEX
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures; fire risk above average. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered.	-1.0 to -1.9
D1	Moderate Drought	Some damage to crops, pastures; fire risk high; streams, reservoirs, or wells low, some water shortages developing or imminent, voluntary water use restrictions requested.	-2.0 to -2.9
D2	Severe Drought	Crop or pasture losses likely; fire risk very high; water shortages common; water restrictions imposed.	-3.0 to -3.9
D3	Extreme Drought	Major crop/pasture losses; extreme fire danger; widespread water shortages or restrictions.	-4.0 to -4.9
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; exceptional fire risk; shortages of water in reservoirs, streams, and wells, creating water emergencies.	-5.0 or less

Drought is monitored nationwide by the National Drought Mitigation Center (NDMC). Indicators are used to describe broad scale drought conditions across the U.S. Indicators correspond to the intensity of drought.

Based on the historical occurrences for drought, the area can anticipate a range of drought from abnormally dry to exceptional or D0 to D4 based on the Palmer Drought Category. Data from the NDMC gathered from 1985[3] to the present indicates that the CVCOG Region experiences drought uniformly, with the planning area experiencing a D2 or Severe Drought on average. Therefore, the communities in the planning area are equally susceptible to drought events and should mitigate to an extent of severe drought.

[2] Source: National Drought Mitigation Center

[3] Historical maps of the Palmer Drought Index are available at: http://www.drought.unl.edu/Planning/Monitoring/HistoricalPDSIMaps.aspx

Historical Occurrences

Due to the seasonal, long term, and widespread nature of the drought hazard, events occur over the course of one year and the same drought event will be reported by multiple counties in a region. One drought event will not occur repeatedly in a single year.

Based on this data, all twelve counties were reporting impacts from seven unique (separate) drought events. Table 13-4 below shows the drought event year and number of events each county reported during the period 1996 – 2010. According to reports from the National Climatic Data Center (NCDC) seven unique events were reported for the area.

Table 13-4. Historical Drought Events by Jurisdiction, 1996-2010

COUNTY	YEAR OF EVENT	TOTAL
Coke	1998, 2000, 2006, 2009	4
Concho	1998, 2000, 2006, 2009	4
Crockett	1998, 2000, 2006, 2009	4
Irion	1998, 2000, 2006, 2009	4
Kimble	1998, 2000, 2008, 2009	4
McCulloch	1998, 2000, 2006, 2009	4
Menard	1998, 2000, 2005, 2006, 2009	5
Reagan	1996, 1998, 2006	3
Schleicher	1998, 2000, 2006, 2009	4
Sterling	1998, 2000, 2006, 2009	4
Sutton	1998, 2000, 2006, 2008	4
Tom Green	1998, 2000, 2006, 2009	4
UNIQUE EVENTS:	**1996, 1998, 2000, 2005, 2006, 2008, 2009**	**7**

Significant Past Events

August 1998
A devastating drought began in 1998 and continued through the end of summer with little or no rain falling, affecting 11 of the 12 counties in the study area. The two main crops across the area, wheat and cotton, were both near total losses, with additional losses to the cattle, sheep and goat industries. Preliminary loss figures top $150 million.

May 2000
This event affected 11 of the 12 counties in the planning region. A devastating drought continued across West Central Texas through the month of May. Information from the

USDA indicate that crop losses total in excess of $85 million for this spring alone, not including losses to the cattle and sheep ranching industries.

Probability of Future Events

Based on occurrence and frequency of past events, it can be expected that a drought event will impact somewhere in the region approximately every other year. Hence, the probability of a future drought occurrence is likely, with an event is probable within three years.

Vulnerability and Impact

Droughts impact large areas and cross jurisdictional boundaries, hence all existing and future buildings, facilities and populations are exposed to this hazard and could potentially be impacted. Since all jurisdictions are considered to be equally affected by drought, each jurisdiction will not be assessed independently.

Droughts may cause a shortage of water for human and industrial consumption, hydroelectric power, recreation and navigation. Water quality may also decline and the number and severity of wildfires may increase. Severe droughts may result in the loss of agricultural crops and forest products, undernourished wildlife and livestock, lower land values, and higher unemployment. Therefore, not only are agricultural businesses vulnerable to drought, but also hydro-electric power and other water-dependent industries, such as forestry and tourism.

Secondary hazards associated with drought are wildfire and expansive soils, but the most direct impact of drought is economic rather than loss of life or immediate destruction of property. This can be significant as it spans many sectors of the economy and reaches well beyond the area experiencing physical drought as water is integral to our ability to produce goods and provide services.

Annual historic losses were estimated based on the recent 15 years of event data (NCDC). Potential loss is simply a projection of historic loss, as are all loss estimates in this risk assessment; however, drought is only based on 15 years of available data where all other hazards were based on 60 years of recording events. Property and crop damages are presented by county and year in Table 13-5 below.

Table 13-5. Drought Event Damage Totals (1996-2010)

COUNTY	PROPERTY DAMAGES (2009 $$)	CROP DAMAGES (2009 $$)	ANNUAL LOSS (AL) ESTIMATE
Coke	$0	$12,498,993	$833,266
Concho	$0	$12,498,993	$833,266
Crockett	$25,254	$12,751,539	$851,786
Irion	$0	$12,498,993	$833,266
Kimble	$25,254	$12,759,549	$852,320
McCulloch	$0	$12,498,993	$833,266
Menard	$7,927,956	$12,759,549	$1,379,167
Reagan	$1,572,435	$24,999,483	$1,771,461
Schleicher	$25,254	$12,751,539	$851,786
Sterling	$0	$12,498,993	$833,266
Sutton	$25,254	$12,751,539	$851,786
Tom Green	$0	$12,498,993	$833,266
SUBTOTALS:	**$9,601,407**	**$163,767,156**	**N/A**
AVERAGES:	**$800,117**	**$13,647,263**	**$963,159**
TOTAL DAMAGES:		**$173,368,563**	

Based on the previous occurrences and potential exposure for the hazard, the potential severity of impact of droughts is limited; critical facilities and services would not be expected to be shut down for more than 24 hours and less than 10 percent of property would be destroyed.