Special Topics

Cotton County Disaster Resiliency Assessment

The purpose of this section is to assess at the county level key components of disaster resiliency. Housing location and quality as well as planning activities can help reduce impacts from disaster events and allow for faster recovery. Disasters can include tornadoes, extreme weather, high winds, as well as man-made events. These events may largely be inevitable, but the ability to reduce damage and casualties as well recovery can be improved with good planning.

C.0 Comprehensive Plans & Hazard Mitigation Plans

There are 4 key communities within the county were included within the county plan (Devol, Randlett, Temple, Walters.

Devol had a population of 151 in 2010 Census and therefore is too small to warrant creation of a comprehensive plan. Randlett had a population of 438 in the 2010 Census an is also too small for the need for a comprehensive plan. Temple had a population of 1,102 in the 2010 Census and does appear not have a comprehensive plan (not typical for this size of town either). Walters had a population of 2,551 at the 2010 Census and does not have a comprehensive plan available. Therefore regional planning for the county is left to the Council of Governments for the area (ASCOG) and the Cotton County government at present.

The other key plan for a city to manage, mitigate and plan for recovery related to disasters is a **Hazard Mitigation Plan** (HMP). Often low density counties, the Hazard Mitigation Plan is done at the county level, though some cities may augment the county plan with a city plan. The Cotton County Hazard Mitigation Plan was adopted May 18th, 2009 and is intended to be updated every five years.

Summary of Key Elements in the HMP

The HMP included a review of the Capital Improvement Plan (CIP) and Emergency Operations Plan. Cotton County does not currently have a permitting system in the rural areas except for flood plain permits. Cotton County participates in the National Flood Insurance Program. (The Cotton County Flood Plain Manager is located in the Cotton County Courthouse.)

C.2.1.1. Historical Data on Natural Disasters and Other Hazards

Data on historical damages and casualties is typically collected as part of a **Hazard Mitigation Plan** preparation to determine the appropriate planning measures and actions to take before and after an event.

For this county the Hazard Mitigation Plan contains the following historic data on disasters and damages in the county:

Identified Hazards

Excerpts from the Cotton County HMP are summarized below as they impact housing and disaster resiliency for the county:

Dam Failure Risk

Walters City Lake – only dam within the county

Dam failures have not occurred in any years between 1954 and 2003. Damages to personal property are zero. Probability of a dam break is rated as unlikely, but the dam designated as high risk per criteria established the Ad Hoc Interagency committee on Dam Safety for Science, Engineering and Technology. There is low population downstream of the dam and vulnerability of a dam failure in Cotton County would be to the roads, bridges and utilities that are downstream of the dam and potential loss of life if vehicles were involved

Drought

All areas of Cotton County are equally susceptible to drought. The most significant potential impacts of drought relates to public water supply for municipal use, including firefighting.

Earthquake

All of Cotton County is equally susceptible to earthquake. Earthquake is not limited to certain areas of the County or certain communities. Cotton County has numerous pipelines, producing oil and gas wells and large buildings that are not constructed to earthquake codes. This creates the possibility of a major catastrophe in the event of a major earthquake.

Earthquakes centered within Cotton County are rare. The few events that have been recorded are largely unfelt and are seismically rated at or below a level 2. Records maintained by the Oklahoma Geological Survey and dating back to 1897 indicate that six occurrences of seismic activity have been recorded in Cotton County. On April 9, 1952, a large earthquake centered near El Reno (in Canadian County) affected most of Oklahoma and extending as far north as Iowa.

Expansive Soils

Expansive soils in Cotton County have shale as the parent material and are found throughout the County. The expansive soil area amounts to about 40% of the County.

Extensive damage from expansive soils can occur to highways and streets. Homes, buildings and other structures can have damage resulting in sticking doors, uneven floors and cracks in the foundation, floors, walls, and ceilings. Since this hazard develops gradually and seldom presents a threat to life, problems may not be recognized as being related to expansive soils or may be considered only nuisances and therefore never reported. **No records of specific incidences of structure loss due to expansive soils in Cotton County were found**.

Extreme Heat

Extreme Heat events are regional in nature. The entire County is equally affected by extreme heat. **3 TEMPERATURE EXTREMES** event(s) were reported in **Cotton County, Oklahoma** between **01/01/1950** and **10/31/2008**. Extreme heat 7/4/2001 in resulted in 8 deaths. From Heat event 7/16/2006 (not Extreme Heat event), 10 deaths, 100 injuries were reported. And on 8/1/2006 8 deaths and $10,000 in property damage occurred related to Heat event.

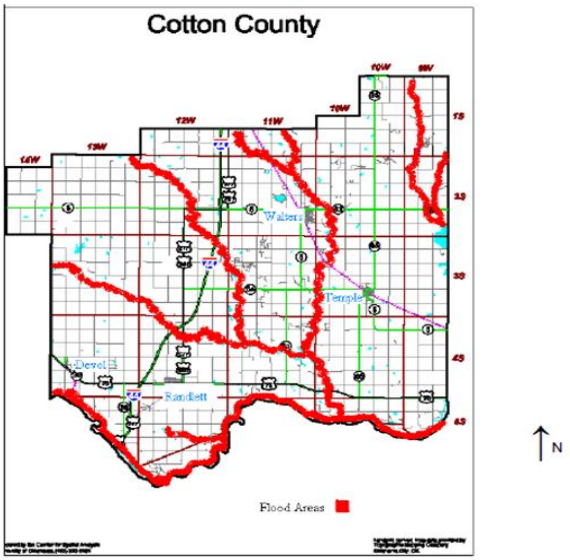
In Cotton County young children, elderly people and those who are sick or overweight are more likely to become victims to extreme heat. Other conditions that can limit the ability to regulate temperature include fever, dehydration, heart disease, mental illness, poor circulation, sunburn, prescription drug use and alcohol use. Another segment of the population at risk is those whose jobs consist of strenuous labor outside. Livestock and crops can also become stressed, decreasing in quality or in production during times of extreme heat.

Extreme high temperatures can cause water shortages, increase fire danger, and prompt excessive demands for energy. Another secondary hazard is air pollution in summer months resulting from consistent high temperatures and reduced airflows.

Flood

There are two types of floods, both which can occur in Cotton County. First, flash floods, which result from localized heavy rain falls. Second, riverine floods occur after extended periods of rain over several days or weeks. Riverine floods generally can be forecast in advance, and proper precautions taken to save lives and mitigate some though certainly not all, property losses.

XV. Figure: Flood Zones of Cotton County.



National Climatic Data Center storm event statistics record 19 flood events in Cotton County during the 10-year period 1993-2003. According to National Flood Insurance Program statistics, rural Cotton County residents had two reported losses and received payments totaling $19,601 during the years 1978 through 2003.

Cotton County has a Countywide flood plain ordinance, which regulates the issuing of building permits within flood zones. Since improvements in Cotton County have been directed away from flood plains, an estimated population of 6 people was found to live in flood zones outside municipalities within the County. Geographic Information Software (GIS) was used to help associate population and housing with flood zones to obtain this estimate. There are no repetitive loss structures in Cotton County. When compared to the County's total population, this resulted in less than 1% of the population living within a flood zone. The County has no residential structures designated as repetitive loss structures.

According to the National Climatic Data Center (NCDC), Cotton County experienced 19 flood events that resulted in approximately $515,000 in flood damages from 1993-2000. Therefore the average potential dollar loss is estimated at $27,105 event. Dollar loss specific to flood damages experienced in Cotton County *outside municipalities* was not found.

Hailstorm

Due to Oklahoma's rapidly changing climate, large-scale hailstorms are especially prevalent. All parts of Cotton County are equally vulnerable to hailstorms. **40 HAIL** event(s) were reported in **Cotton County, Oklahoma** between **01/01/1987** and **04/30/2007 with hail size of at least 1.5 inch(es)**.

According to the NCDC, Cotton County experienced 63 large-hail events since 1956. Since most hail losses are insured or go unreported, no loss figures are estimated for those events

Estimates of Dollar Losses Due to Hail: To make a 10-year potential loss estimate from a hailstorm these assumptions or factors were used:

1. The average damage to a housing unit from a hailstorm is $3,500.
2. The average damage to a commercial buildings and County barns from a hailstorm is $14,000.
3. The damage to the courthouse from a hailstorm is $140,000.
4. All buildings are equally likely to experience hail.
5. The probability of hail damage in a decade is 5%.

Severe Winter Storms

All parts of Cotton County are susceptible to severe winter storms. Fortunately, Cotton County is not affected by blizzard as often as other parts of the state. Damages usually occur in loss of water due to frozen water lines and loss in agricultural revenue due to loss of livestock. During times of more than average accumulation structures can collapse due to the added weight of snow and ice. Ice dams can cause additional roof damage.

Over the past 23 years (1984 - 2007), the National Climatic Data Center has recorded that Cotton County has experienced 6 significant winter storm events. Some examples of past winter storm events in Cotton County include the following:

January 5-7, 1988 - Significant snowfall amounts were reported across Oklahoma. The storm totals exceeded 6-inches over virtually the entire state, except a few areas near the Red River and the far western Oklahoma Panhandle.

November 24, 1996 - Ice accumulated up to 1/2 inch thick mainly southeast of a line from Shawnee in Pottawatomie to Chickasha, in Grady County to Frederick in Tillman County. Power was out to a large portion of the area due to icing of power lines and tree limbs. It took as long as 3 days to restore power to some customers.

December 20, 1998 - Light-freezing rain produced a thin layer of ice on most roads. Across the entire state, there were 13 fatal traffic accidents and 100 injury-related traffic accidents.

January 30, 2002 - Ice accumulations of 1 to 2 inches. The worst damage occurred in a 60-mile wide band, extending from near Ponca City, in Kay County southwestward toward Anadarko in Caddo County and Hobart in Kiowa County. Dozens of towns were left completely without power for days, with some residents without power for weeks. The damage was catastrophic in places, with thousands of utility poles, along with thousands of trees, brought down by the weight of the ice

In late December 2000, a winter storm caused an estimated $74,250,000 in damages in Cotton County and surrounding areas. Therefore, based on past damages, potential dollar loss per event can be substantial.

Tornado & Wind

Tornadoes and high winds are combined in profile because of similarities in potential damage and mitigation measures. All of Cotton County is equally susceptible to tornado and high wind damages. Due to the County wide probability every structure has equal probability to be struck by a tornado or high wind.

34 TORNADO(s) were reported in **Cotton County, Oklahoma** between **01/01/1951** and **03/31/2007**. 7 deaths, 17 injuries, and $1.764M in property damages were reported over that extended time period. No deaths or injuries have occurred from Tornados since 1973.

In the last 57 years Cotton County had 34 tornadoes and 132 high wind events and, resulting in an average of .64 tornadoes and 2.49 high wind events per year. Therefore the probability of a tornado and a high wind occurring within the County each year is highly likely.

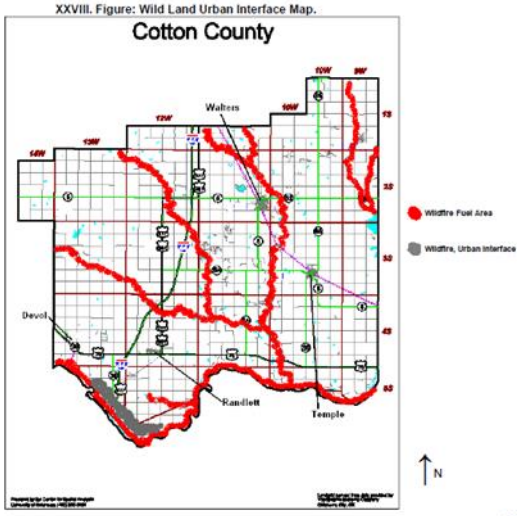
Cotton County averages 2.3 high wind events per year. At an average loss of $7,580 per thunderstorm-wind event, an annual loss of $17,441 can be expected.

Cotton County projected an estimated potential dollar loss of $26,713 for each thunderstorm event that includes high wind, hail and/or lightning.

Wild Fire

Wild fire fuel areas follow the riparian corridors (see flood map) due to vegetation growth near water. The key risk area for urbanized areas to be impacted by wild fires is between Devol and Randlett (see grey area on map below)

XXVIII. Figure: Wild Land Urban Interface Map.



1 WILD & FOREST FIRE event(s) were reported in **Cotton County, Oklahoma** between **01/01/1950** and **10/31/2008**. This event took place 11/27/2005 and there were 4 injures and $2.1M in property damages.

Thunderstorms & Lightning

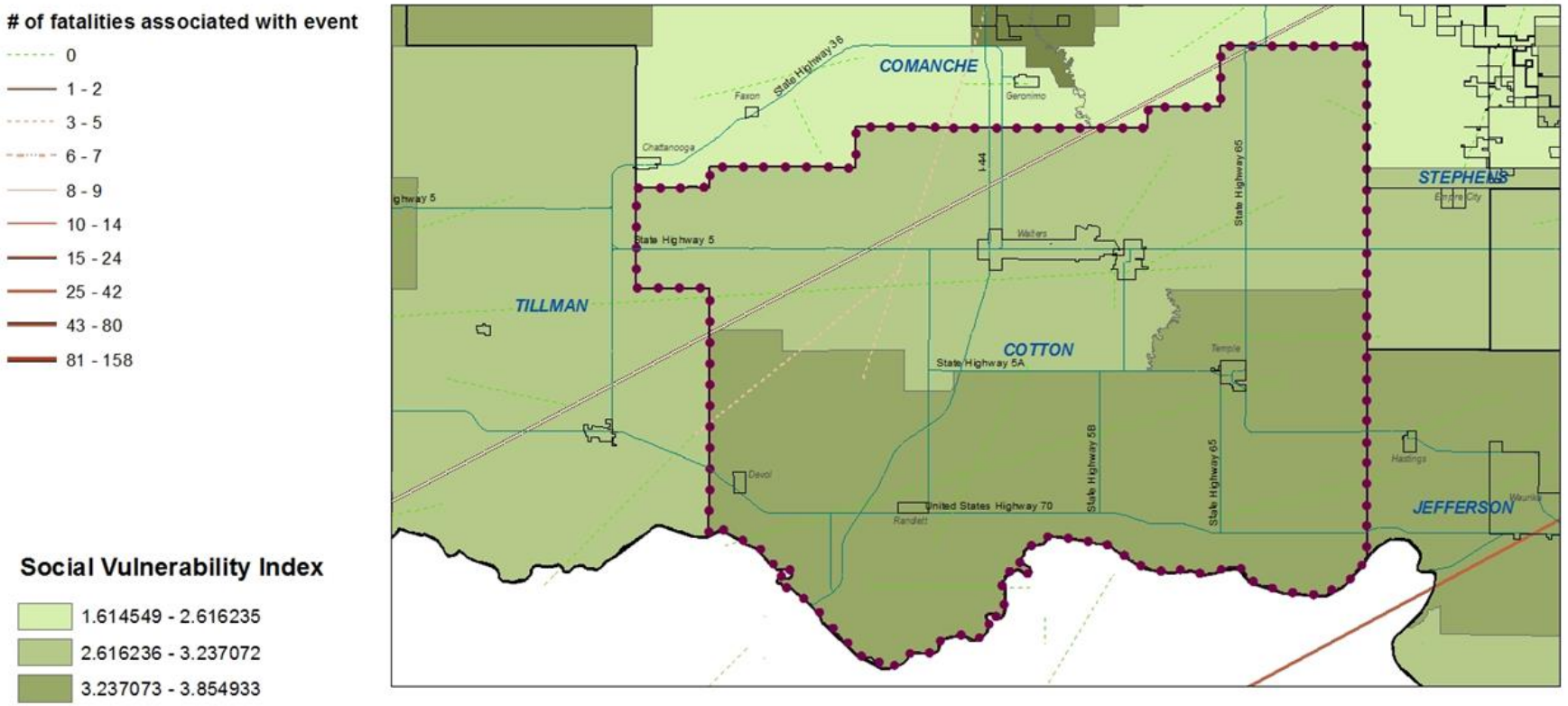
All parts of Cotton County are at risk for thunderstorms. Lightning killed 98 people and injured 243 in Oklahoma during the 1959-2003. According to NCDC data Cotton County has recorded 132 thunderstorm and high wind events the past 53 years.

For all the county profiles for this study we are providing maps of the historic tornados mapped over the developed social vulnerability index. This is in addition to the data prepared and summarized from the HMP in this section.

Social Vulnerability - Impacts on Housing & Disaster Resiliency

Tornado Events 1950 - 2014

Cotton County

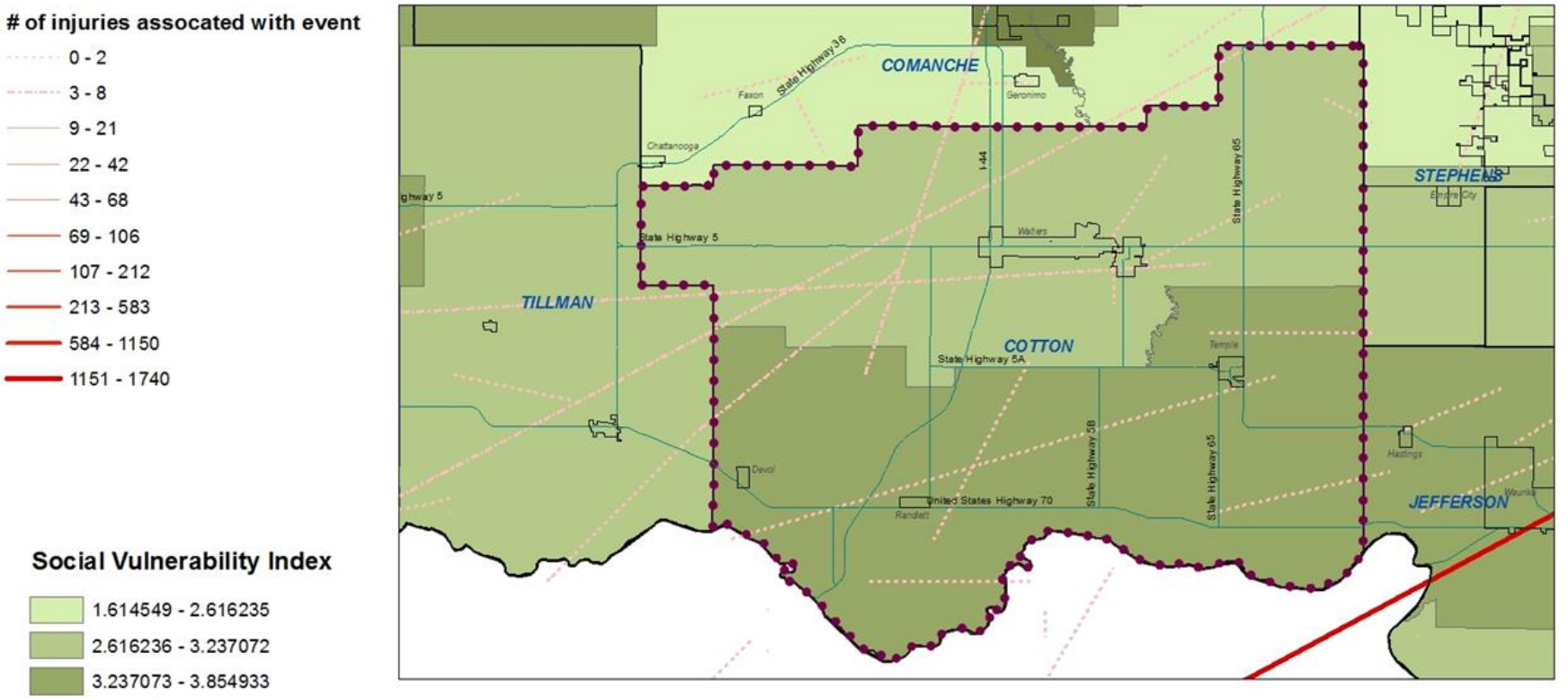


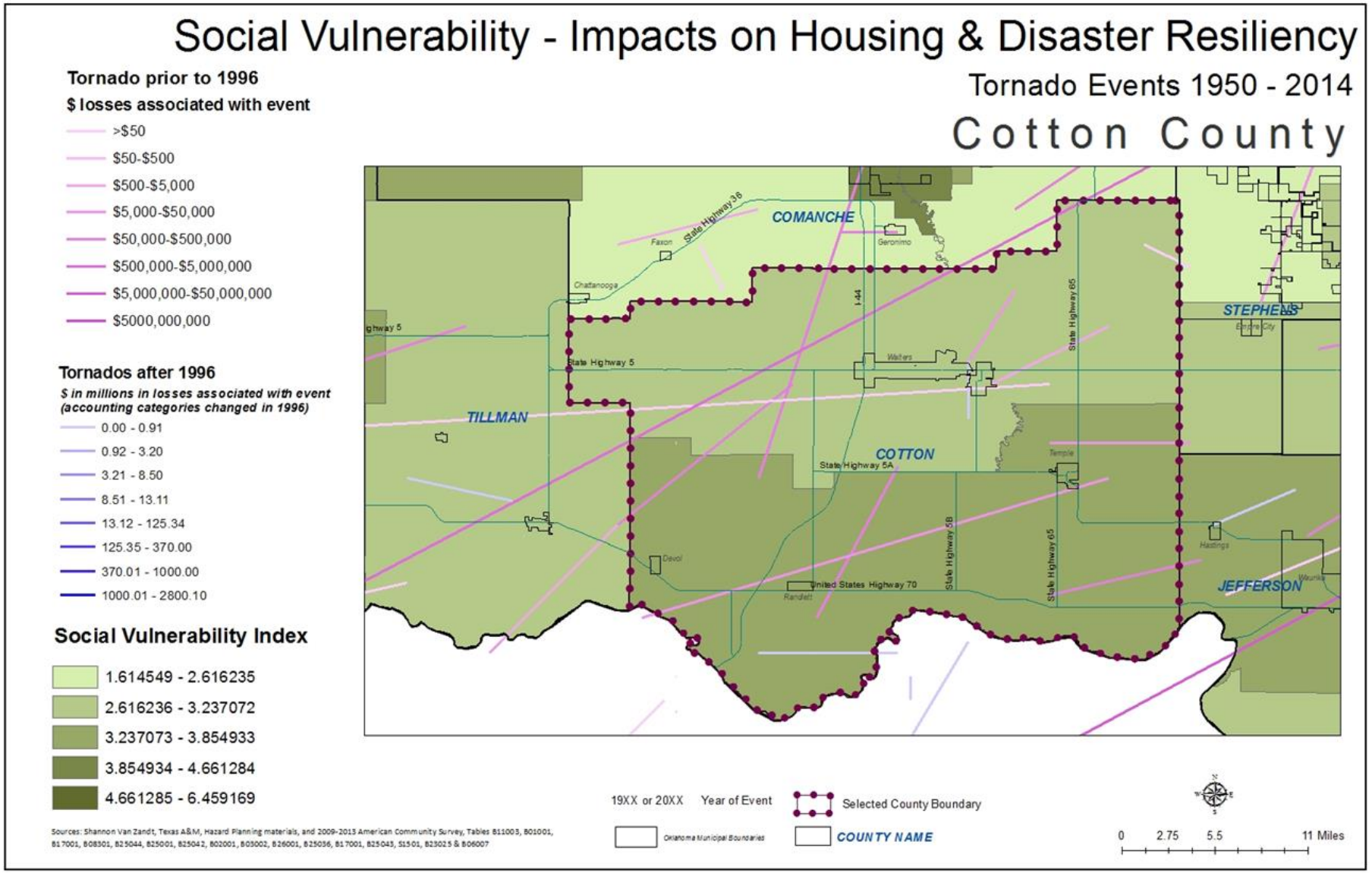
Sources: Shannon Van Zandt, Texas A&M, Hazard Planning materials, and 2009-2013 American Community Survey, Tables B11003, B01001, B17001, B08301, B25044, B25001, B25042, B02001, B03002, B26001, B25036, B17001, B25043, S1501, B23025 & B06007

Social Vulnerability - Impacts on Housing & Disaster Resiliency

Tornado Events 1950 - 2014

Cotton County




Social Vulnerability - Impacts on Housing & Disaster Resiliency
Tornado Events 1950 - 2014
Cotton County
Tornado prior to 1996
$ losses associated with event
>$50
$50-$500
$500-$5,000
$5,000-$50,000
$50,000-$500,000
$500,000-$5,000,000
$5,000,000-$50,000,000
$5000,000,000
Tornados after 1996
$ in millions in losses associated with event
(accounting categories changed in 1996)
0.00 - 0.91
0.92 - 3.20
3.21 - 8.50
8.51 - 13.11
13.12 - 125.34
125.35 - 370.00
370.01 - 1000.00
1000.01 - 2800.10
Social Vulnerability Index
1.614549 - 2.616235
2.616236 - 3.237072
3.237073 - 3.854933
3.854934 - 4.661284
4.661285 - 6.459169
COMANCHE
TILLMAN
COTTON
JEFFERSON
STEPHENS
State Highway 36
State Highway 5
State Highway 5A
State Highway 65
State Highway 5B
United States Highway 70
I-44
Fasxon
Geronimo
Chattanooga
Waters
Temple
Devol
Randlett
Hastings
Empire City
19XX or 20XX Year of Event
Selected County Boundary
Oklahoma Municipal Boundaries
COUNTY NAME
0 2.75 5.5 11 Miles
Sources: Shannon Van Zandt, Texas A&M, Hazard Planning materials, and 2009-2013 American Community Survey, Tables B11003, B01001, B17001, B08301, B25044, B25001, B25042, B02001, B03002, B26001, B25036, B17001, B25043, S1501, B23025 & B06007

C.2.1.2; C.2.1.6; C.2.1.7;C.2.1.8 Shelters from Disaster Event

The HMP for Cotton County outlines several education programs to manage some of the risks described above. Specific for tornados they have recommended Emergency Operation Plan for Tornadoes and an education program to encourage safe room installations to reduce the loss of life. Additionally 10 new Storm Shelters installed to reduce the loss of life were recommended at an estimated cost of $500,000 (scheduled for implementation in 2009). There is no specific discussion about direct measures to provide safe rooms or shelters for lower income, multifamily, or HUD units. A Tie Down – Mobile Homes & Other Structures Education Program was also included in the HMP.

C.2.1.3 Public Policy and Governance to Build Disaster Resiliency

The State of Oklahoma has not granted to counties broad regulatory powers to enact and enforce building codes, building inspections, subdivision regulations and growth management initiatives. Cotton County does have power to regulate all platting of land, all construction of dwelling units or commercial or industrial structures and all future development within a delineated floodplain area, except land held in trust by the United States for Native Americans.

C.2.1.4 Local Emergency Response Agency Structure

Hazard Mitigation Plan/ Emergency Operations Management Plan does not have a specified chain of command or flow chart indicating at the local level how response during and after an event will be managed. Recommend that the County consider spelling out roles and responsibilities similar to that prepared for the state (State Emergency Operations Plan http://www.ok.gov/OEM/documents/2009%20EOP.pdf)

C.2.1.5 Threat & Hazard Warning Systems

The Cotton County HMP recommends obtaining mobile communications equipment for spotters and emergency response teams and installation of NOAA Receivers in Public Facilities (includes schools and hospitals).

Social Vulnerability

Based on the research work done by the Texas A&M University Hazard Reduction and Recovery Center, an added component is being included in this section. Social vulnerability can place households at a further disadvantage during and after a disaster. This analysis is assessing for the county the levels of social vulnerability based on demographic indicators to highlight 'hotspots' or counties that have higher social vulnerability. That combined with Hazard Mitigation Plans – or lack thereof – can highlight places where additional work is needed to reduce impacts on households.

Levels of Social Vulnerability Analysis

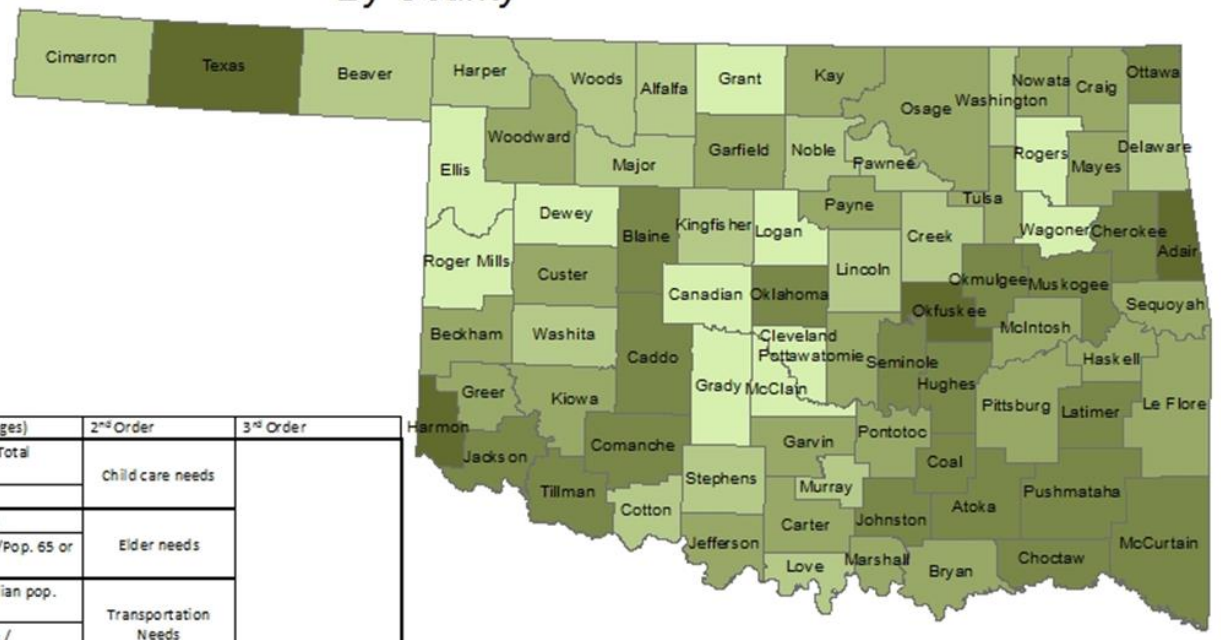
Social Vulnerability Analysis - Cotton County

Base Social Vulnerability Indicators (%)		2nd Order	3rd Order
1.) Single Parent Households	14.64%	0.206 (Child Care Needs)	**3.106 Social Vulnerability 'Hotspot' or Area of Concern**
2.) Population Under 5	5.95%		
3.) Population 65 or Above	17.40%	0.265 (Elder Needs)	
4.) Population 65 or Above Poverty Rate	9.14%		
5.) Workers Using Public Transportation	0.11%	0.056 (Transportation Needs)	
6.) Occupied Housing Units w/o Vehicle	5.50%		
7.) Housing Unit Occupancy Rate	78.06%	2.333 (Temporary Shelter and Housing Recovery Needs)	
8.) Rental Occupancy Rate	25.63%		
9.) Non-White Population	21.65%		
10.) Population in Group Quarters	1.87%		
11.) Housing Units Built Prior to 1990	81.88%		
12.) Mobile Homes, RVs, Vans, etc.	9.52%		
13.) Poverty Rate	14.71%		
14.) Housing Units Lacking Telephones	1.62%	0.246 (Civic Capacity Needs)	
15.) Age 25+ With Less Than High School Diploma	14.10%		
16.) Unemployment Rate	7.50%		
17.) Age 5+ Which Cannot Speak English Well or Not At All	1.35%		

Sources: Shannon Van Zandt, Texas A&M, Hazard Planning materials, and 2009-2013 American Community Survey, Tables B11003, B01001, B17001, B08301, B25044, B25001, B25042, B02001, B03002, B26001, B25036, B17001, B25043, S1501, B23025 & B06007

Social Vulnerability Index

By County



Levels of Social Vulnerability Analysis

Base Social Vulnerability Indicators (Percentages)	2nd Order	3rd Order
1. Single parent households with children/ Total Households	Child care needs	Social vulnerability "Hotspot" or area of concern
2. Population 5 or below/Total Population		
3. Population 65 or above/Total Population	Elder needs	
4. Population 65 or above & below poverty/Pop. 65 or above		
5. Workers using public transportation/Civilian pop. 16+ and employed	Transportation Needs	
6. Occupied housing units without a vehicle / Occupied housing units (Hus)		
7. Occupied housing units / Total housing units	Temporary Shelter and housing Recovery needs	
8. Persons in renter occupied housing units/ Total housing units		
9. Non-white population/Total population		
10. Population in group quarters / Total population		
11. Housing units built 20 years ago / Total housing units		
12. Mobile Homes/ Total housing units		
13. Persons in poverty / Total population		
14. Occupied housing units without a telephone/ Total occupied HU	Civic Capacity needs	
15. Population above 25 with less than high school/ Total pop above 25		
16. Population 16+ in labor force an unemployed/ Pop in Labor force 16+		
17. Population above 5 that speak English not well or not at all / Pop >5		

Source: Shannon VanZandt, Texas A&M, Hazard Planning materials; 2008-2013 American Community Survey, Tables B11003, B01001, B17001,

Legend

Social Vulnerabiity "Hot Spots"

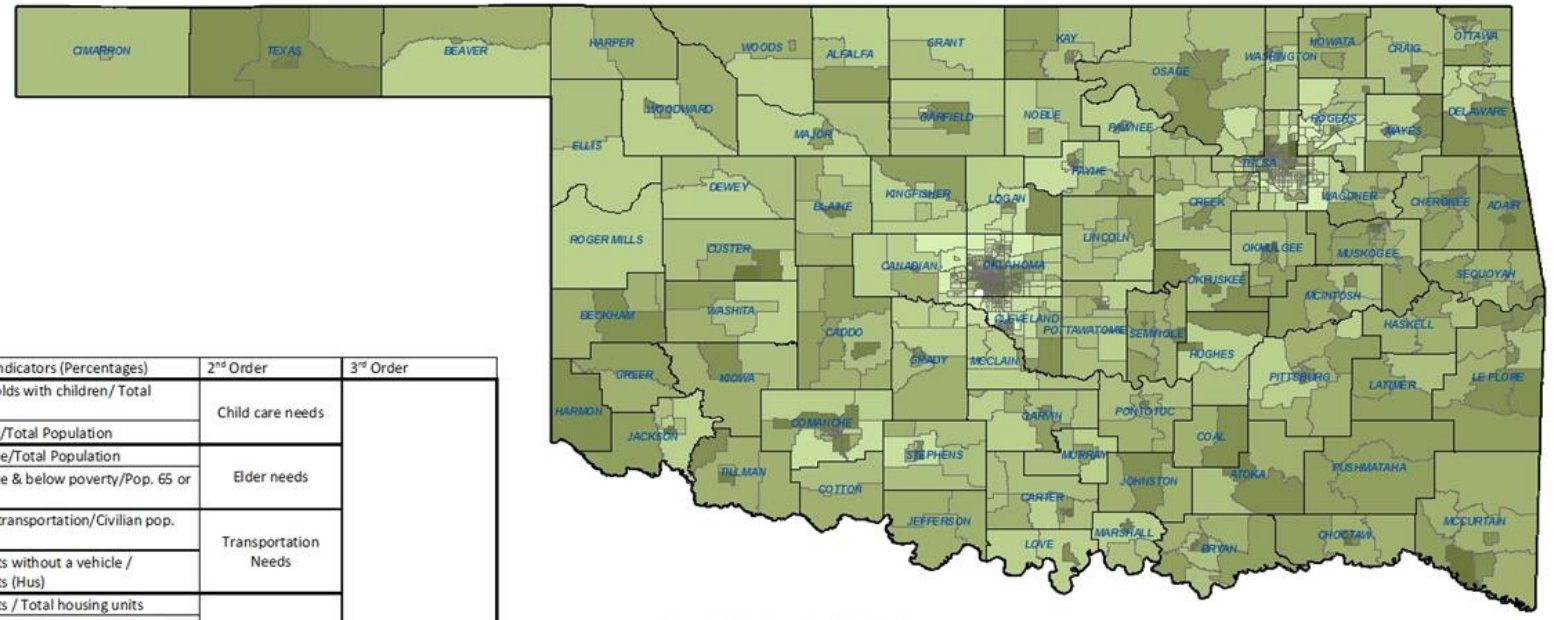
- 2.6340 - 2.9760
- 2.9761 - 3.2170
- 3.2171 - 3.4180
- 3.4181 - 3.6370
- 3.6371 - 3.9500

0 25 50 100 Miles

Social Vulnerability - Impacts on Housing & Disaster Resiliency

Base Social Vulnerability Indicators (Percentages)	2nd Order	3rd Order
1. Single parent households with children/ Total Households	Child care needs	Social vulnerability "Hotspot" or area of concern
2. Population 5 or below/Total Population		
3. Population 65 or above/Total Population	Elder needs	
4. Population 65 or above & below poverty/Pop. 65 or above		
5. Workers using public transportation/Civilian pop. 16+ and employed	Transportation Needs	
6. Occupied housing units without a vehicle / Occupied housing units (Hus)		
7. Occupied housing units / Total housing units	Temporary Shelter and housing Recovery needs	
8. Persons in renter occupied housing units/ Total housing units		
9. Non-white population/Total population		
10. Population in group quarters / Total population		
11. Housing units built 20 years ago / Total housing units		
12. Mobile Homes/ Total housing units		
13. Persons in poverty / Total population		
14. Occupied housing units without a telephone/ Total occupied HU	Civic Capacity needs	
15. Population above 25 with less than high school/ Total pop above 25		
16. Population 16+ in labor force an unemployed/ Pop in Labor force 16+		
17. Population above 5 that speak English not well or not at all / Pop >5		

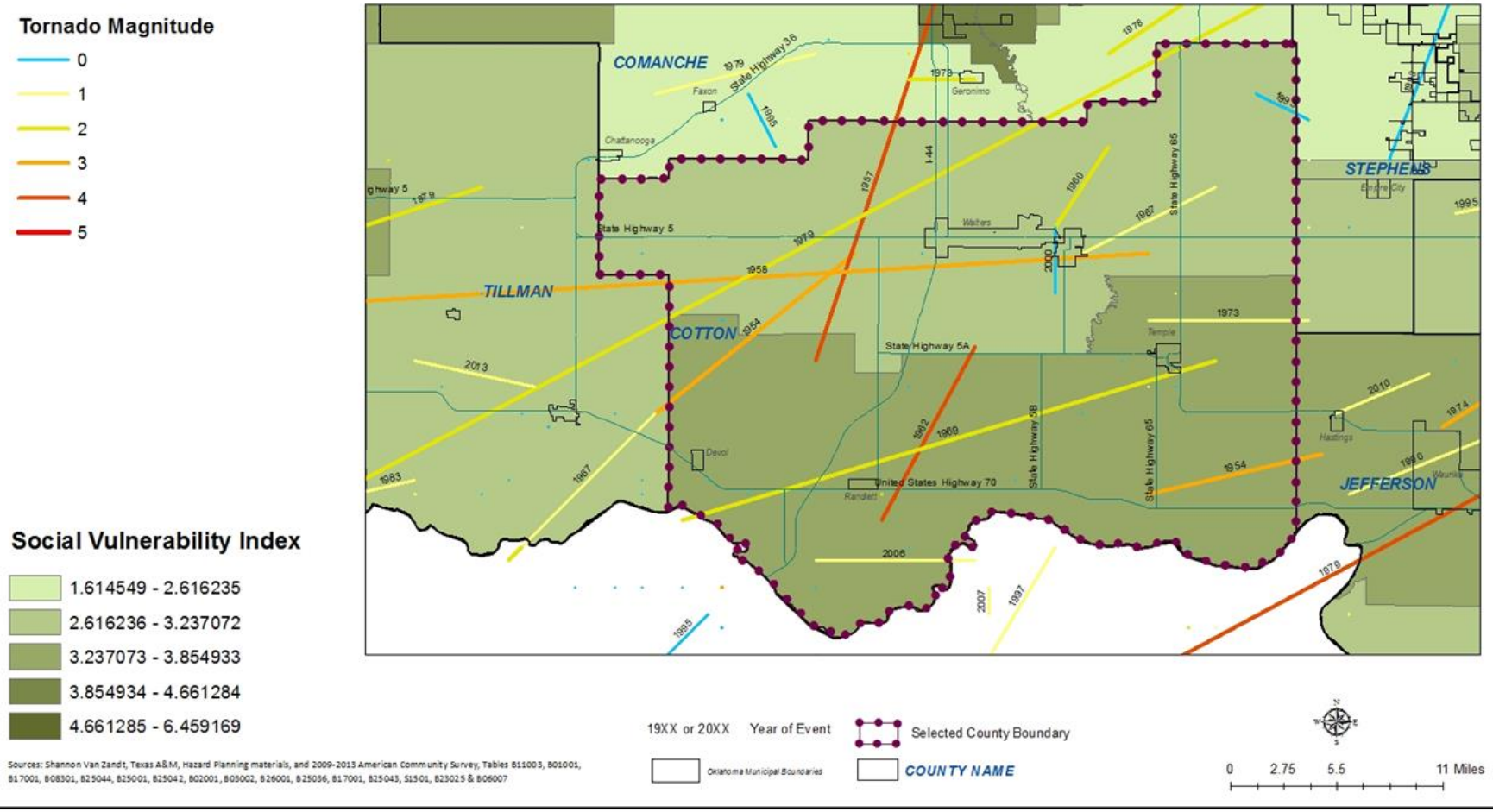
Sources: Shannon Van Zandt, Texas A&M, Hazard Planning materials, and 2009-2013 American Community Survey, Tables B11003, B01001, B17001, B08301, B25044, B25001, B25042, B02001, B03002, B26001, B25036, B17001, B25043, S1501, B23025 & B06007



Social Vulnerability - Impacts on Housing & Disaster Resiliency

Tornado Events 1950 - 2014

Cotton County



Social vulnerability combined with the devastating impacts of a natural or man-made disaster can compound a household's ability to recover and in fact can place those individuals at an even great gap or disadvantage prior to the event (Shannon Van Zandt, Texas A&M, Hazard Planning).

This county falls below the state score per this index for social vulnerability when comparing as a county to other counties in the state. The southern census tracts within the county are somewhat displaying increased social vulnerability is notable.

Recommendations for this county:

- Continue to update and maintain the county HMP and include attention to areas within the county that in addition to physical vulnerability may have compounding social vulnerability factors.
- Creating a supplemental Emergency Operations Plan consistent with the Oklahoma Department of Emergency Management
- Efforts to strengthen building codes related to tornadoes and natural disasters should be considered.
- Planning for shelters from disaster events for multifamily, HUD and LIHTC units, in addition to all housing in the community should be incorporated with any effort to increase housing.