Special Topics

Kiowa 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 8 key cities within the county (Hobart, Mountain View, Snyder, Lone Wolf, Gotebo, Mountain Park, Roosevelt, Cooperton).

> **Comprehensive plans** are the guiding documents for cities of various sizes to address key aspects of their community from land use, transportation, environment, housing, and economic development.

The other key plan for a city to manage, mitigate and plan for recovery related to disasters is a **Hazard Mitigation Plan** (or Emergency Management Plan). 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.

> Kiowa County does have a Hazard Mitigation Plan and an Emergency Operations Plan.

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.

The Kiowa HMP first identified the key vulnerabilities for the county:

HAZARD VULNERABILITY BY JURISDICTION

	DAM FAILURE	DROUGHT	EARTHQUAKE	EXTREME HEAT	FLOOD	HAIL	HIGH WINDS	LIGHTNING	TORNADO	WILDFIRE	WINTER STORM
COUNTY											
Kiowa	X	X	X	X	X	X	X	X	X	X	X
SCHOOLS											
Hobart		X	X	X	X	X	X	X	X		X
Lone Wolf		X	X	X		X	X	X	X		X
Mt. View-Gotebo		X	X	X		X	X	X	X		X
Snyder		X	X	X		X	X	X	X		X
CITIES/ TOWNS											
Cooperton		X	X	X		X	X	X	X	X	X
Gotebo		X	X	X	X	X	X	X	X	X	X
Hobart		X	X	X	X	X	X	X	X	X	X
Lone Wolf		X	X	X	X	X	X	X	X	X	X
Mt. Park	X	X	X	X	X	X	X	X	X	X	X
Mt. View		X	X	X	X	X	X	X	X	X	X
Roosevelt		X	X	X	X	X	X	X	X	X	X
Snyder	X	X	X	X	X	X	X	X	X	X	X

HMP, p. 19

Dam Failures
“Dam failures have not occurred in any years between 1950 and 2013. Damages to personal property are estimated at $0.00.” P. 22

Flooding

“National Climatic Data Center storm event statistics record 27 flood events in Kiowa County and participating jurisdictions during the 10-year period 2000-2013. According to National Flood Insurance Program statistics, Kiowa County residents had four reported losses and received payments totaling $360,000.00 as of January 2013.” P. 32

“**Flood Events**

April 30, 2000 - Slow moving thunderstorms formed over portions of western and central Oklahoma during the late morning of the 30th and continued through mid-evening. These storms were responsible for isolated areas of wind damage, large hail, lightning damage, and flooding.

June 22, 2004 - Rainfall totals up to 5 inches in the Hobart, OK area during the evening and overnight hours of June 21-22 produced flash flooding along Frisco Creek. The creek overflowed its banks and flooded Third Street and Business Highway 9 in Hobart during the
late morning hours of June 22.

August 22, 2005 - Storm total rainfall amounts of 2 to 5 inches fell over portions of the North Fork of the Red River basin in northwestern Kiowa County on August 21-22. As the heavy runoff from these rains eventually traveled from smaller tributaries (including Elk Creek) into the North Fork of the Red River, minor rural flooding occurred on the river along the Kiowa/Jackson County border near and at one river forecast point in the area. The North Fork of the Red River, 3 miles east of Headrick, crested at 15.2 feet, 1.2 feet above flood stage, at 6:30 am CST on August 23, and remained above flood stage from 7:00 pm CST on August 22 to 2:30 pm
CST on August 23. Only lowland areas along the river were flooded during this event. Further downstream on the North Fork of the Red River, the flood crest attenuated and was measured well below flood stage at the USGS river gage site near Tipton, OK on the Jackson/Tillman County border.

June 13, 2007 - The very wet pattern continued over Oklahoma on the 13th. An outflow boundary was situated northwest to southeast over parts of northern and central Oklahoma. Other outflow boundaries were scattered over the western half of the state as well. A very slow moving upper level storm system drifted toward western Oklahoma. This helped thunderstorms develop over much of western Oklahoma. The thunderstorms produced very large hail, strong winds, and tornadoes over parts of the area. Also, due to the slow movement of the thunderstorms, flash flooding continued to be a concern with several roads washed out. The event lasted well into the evening before finally ending during the early morning hours. Monetary damages were estimated. Two swift-water rescues were initiated due to high water in Hobart. Two bridges were heavily damaged. Thirty homes and eight businesses reported some kind
of flood damage. **Four-hundred and fifty feet of railroad tracks along HWY 9 in Hobart were washed out. Monetary damages were estimated at $150,000**.

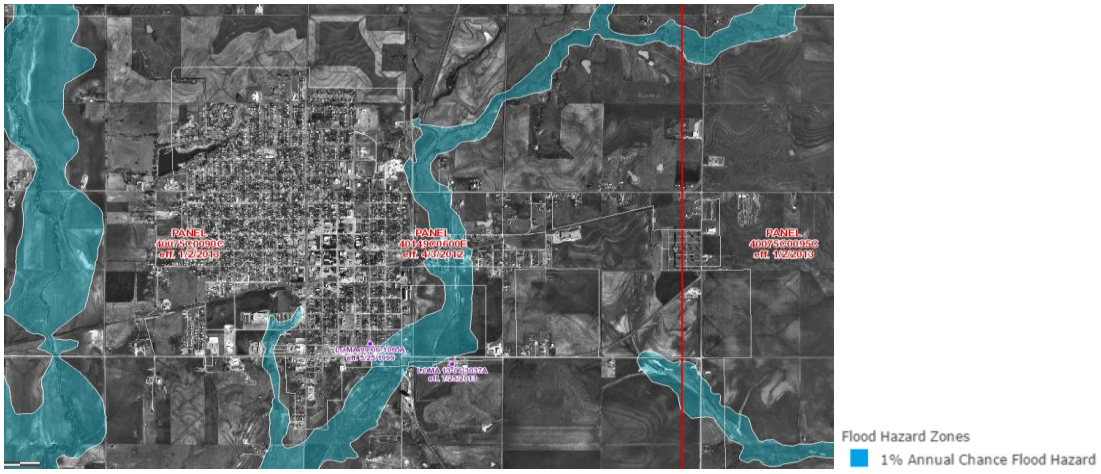
August 19, 2007 - Tropical Storm Erin, the fifth named storm of the 2007 Atlantic Hurricane season, developed quickly over the northeast Gulf of Mexico on the 15th, before moving onshore during the morning hours of the 16th. Low-level wind shear north and east of Erin increased throughout the evening, with several tornadoes reported in Kiowa, Washita, and Grady counties during the late afternoon and early evening hours. Damage was reported east of Hobart, and in Washita county south and east of Cordell. Wind gusts of 50 to 80 mph were also reported over parts of central Oklahoma at this time. As with the wind speeds, thunderstorms intensities increased, with two additional tornadoes reported over central Oklahoma Sunday morning. In addition to tornadoes and very strong winds, rainfall rates of over three inches per hour were common, with significant flash flooding reported in numerous counties. Rainfall amounts exceeded five inches over a large area, with some locations receiving eight to ten inches. Rivers and creeks easily exceeded their banks, with water also rising quickly in many towns. Dozens of people were rescued by boat and helicopter as numerous homes and businesses quickly took on water. Unfortunately, **six people lost their lives due to the flooding. A house and two vehicles were washed away by the high water from Stinking Creek. The flood water was five feet deep near the location of the house. Monetary damages were estimated at $60,000.**

June 5, 2010 - A very moist, tropical air mass was in place over Oklahoma for several days of early July. Late on the 4th, a weak trough entered parts of southwest Oklahoma, with widespread precipitation developing along and just ahead of it. Intense rainfall developed

over southwest Oklahoma, **especially over Hobart early**, and then east toward Caddo County later in the morning. Flash flooding quickly became a concern, as several roadways became flooded. Later in the afternoon, a stronger upper level disturbance moved across the central plains, with a weak cold front entering northwest Oklahoma. Thunderstorms developed along this boundary by mid afternoon and moved east into north-central Oklahoma.

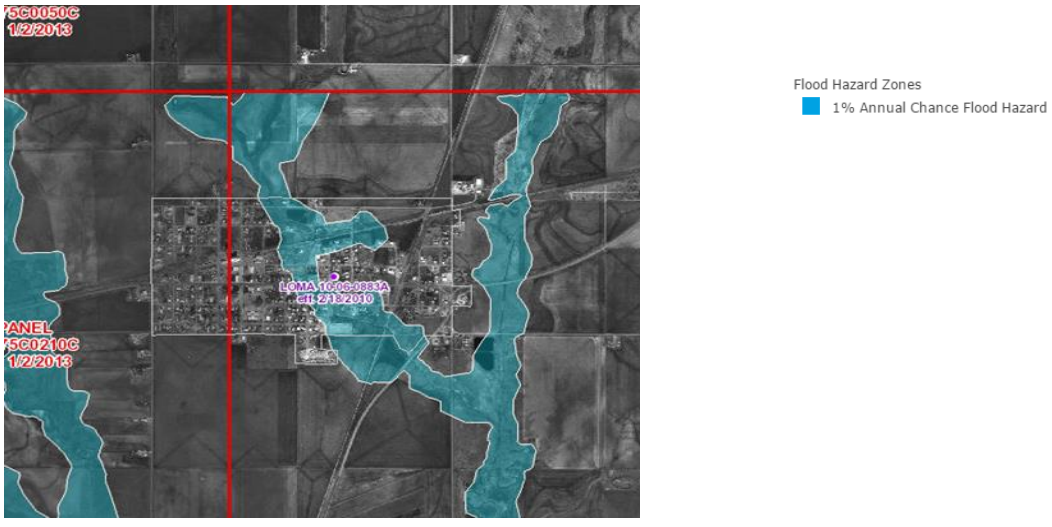
All parts of the county may be subject to flash flooding, freeze-thaw flooding and extreme precipitation that can cause flooding, unrelated to the streams and rivers. Development in the floodplain, however, increases risk of damages and property loss potentially repeatedly.

Hobart



FEMA's National Flood Hazard Layer http://fema.maps.arcgis.com/

Lone Wolf

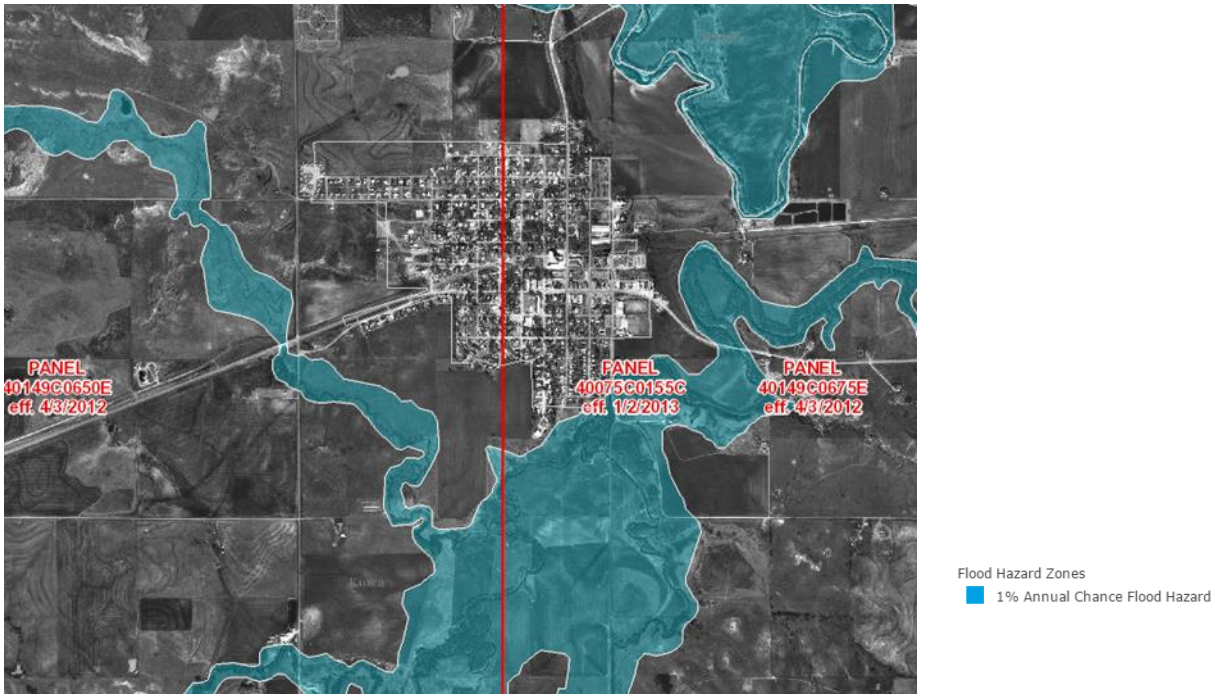


FEMA's National Flood Hazard Layer http://fema.maps.arcgis.com/

Gotebo

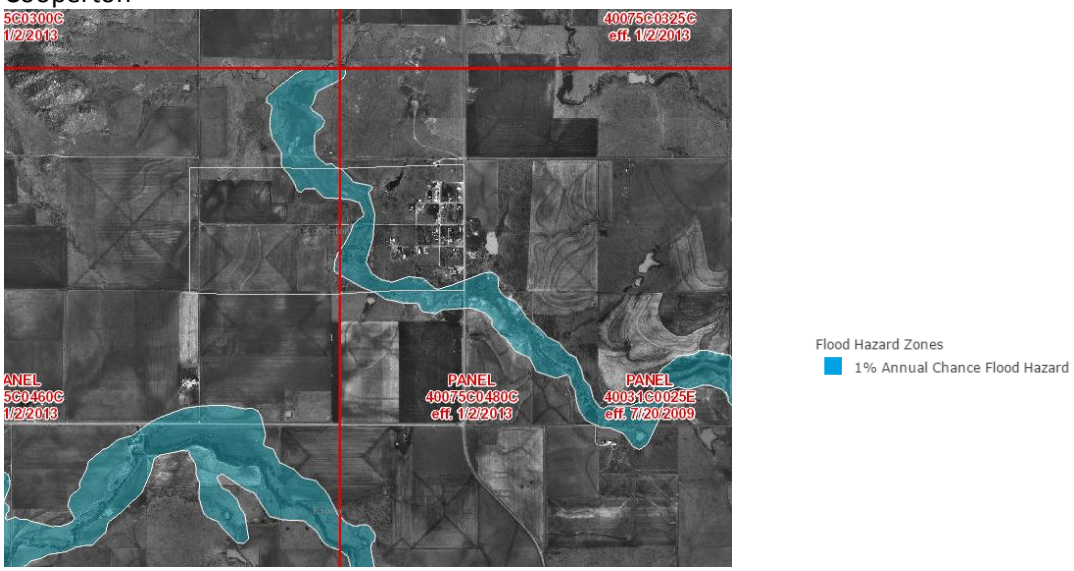
FEMA's National Flood Hazard Layer http://fema.maps.arcgis.com/

Mountain View



FEMA's National Flood Hazard Layer http://fema.maps.arcgis.com/

Cooperton

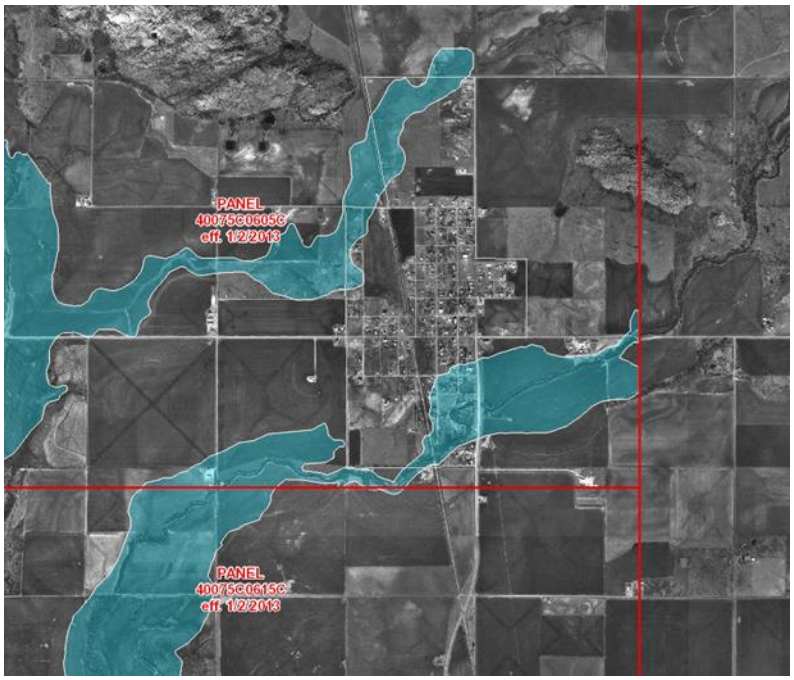


FEMA's National Flood Hazard Layer http://fema.maps.arcgis.com/

Roosevelt

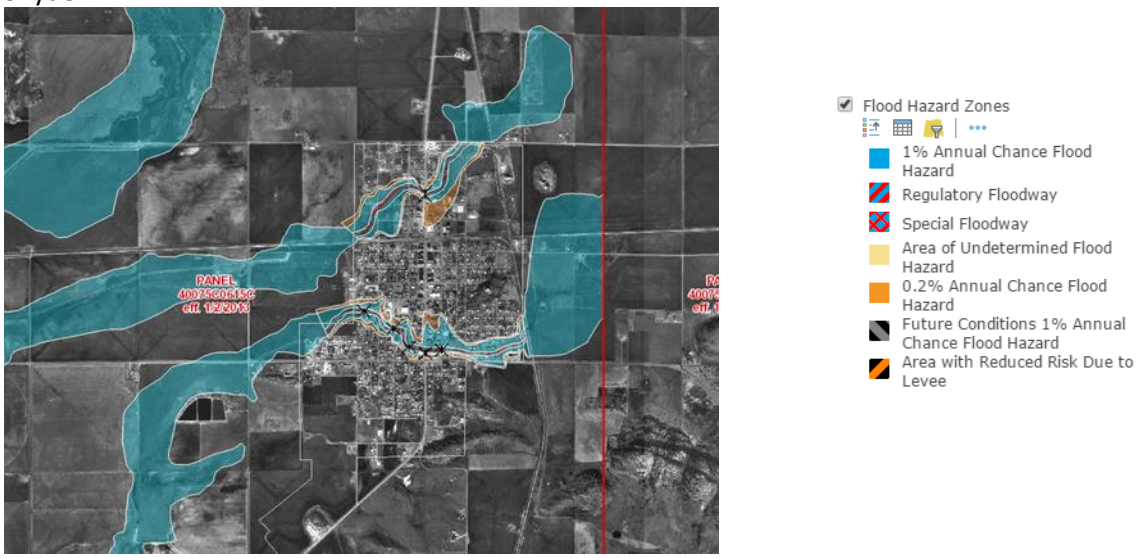
FEMA's National Flood Hazard Layer http://fema.maps.arcgis.com/

Mountain Park



FEMA's National Flood Hazard Layer http://fema.maps.arcgis.com/

Snyder



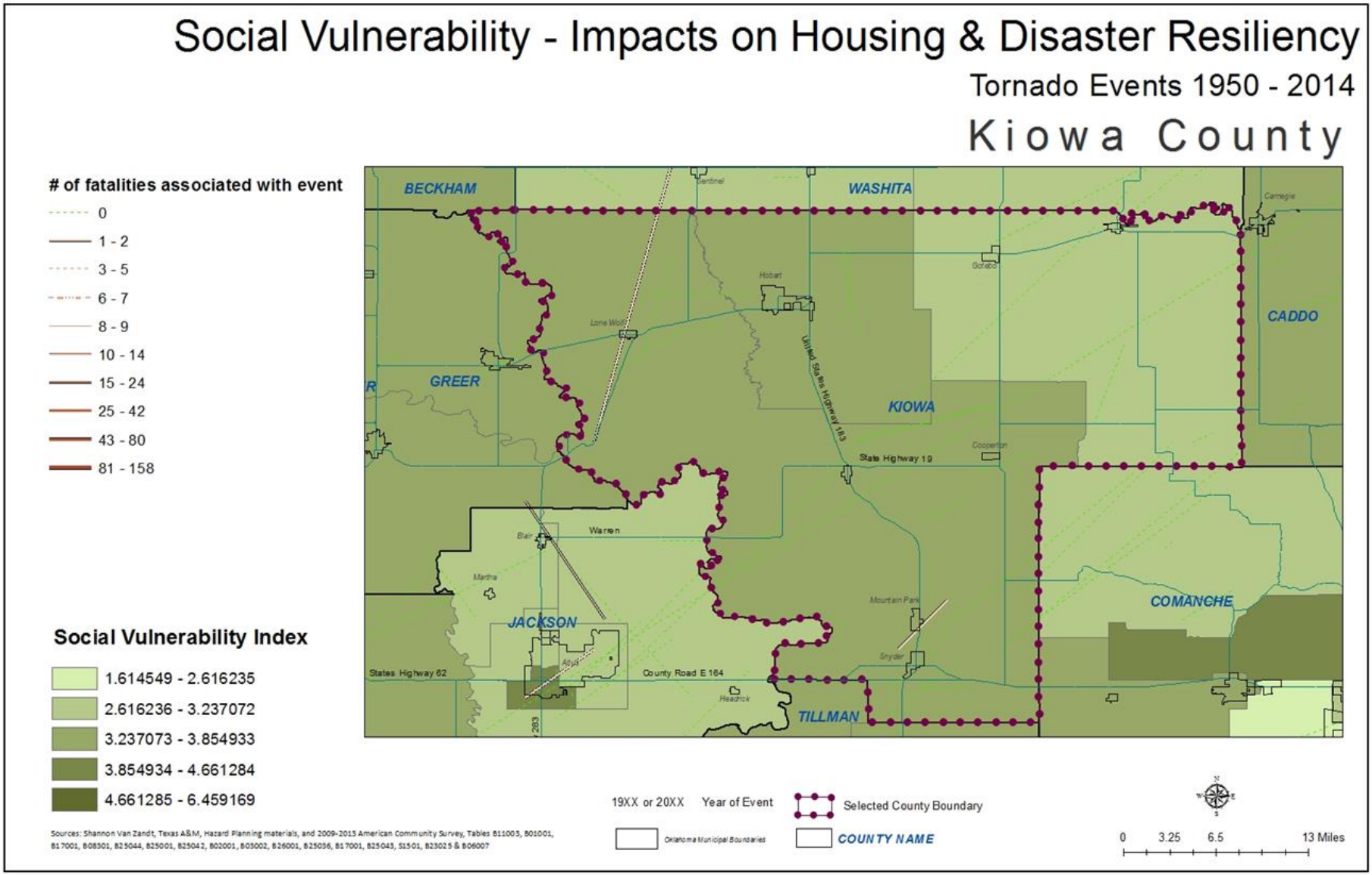
FEMA's National Flood Hazard Layer http://fema.maps.arcgis.com/

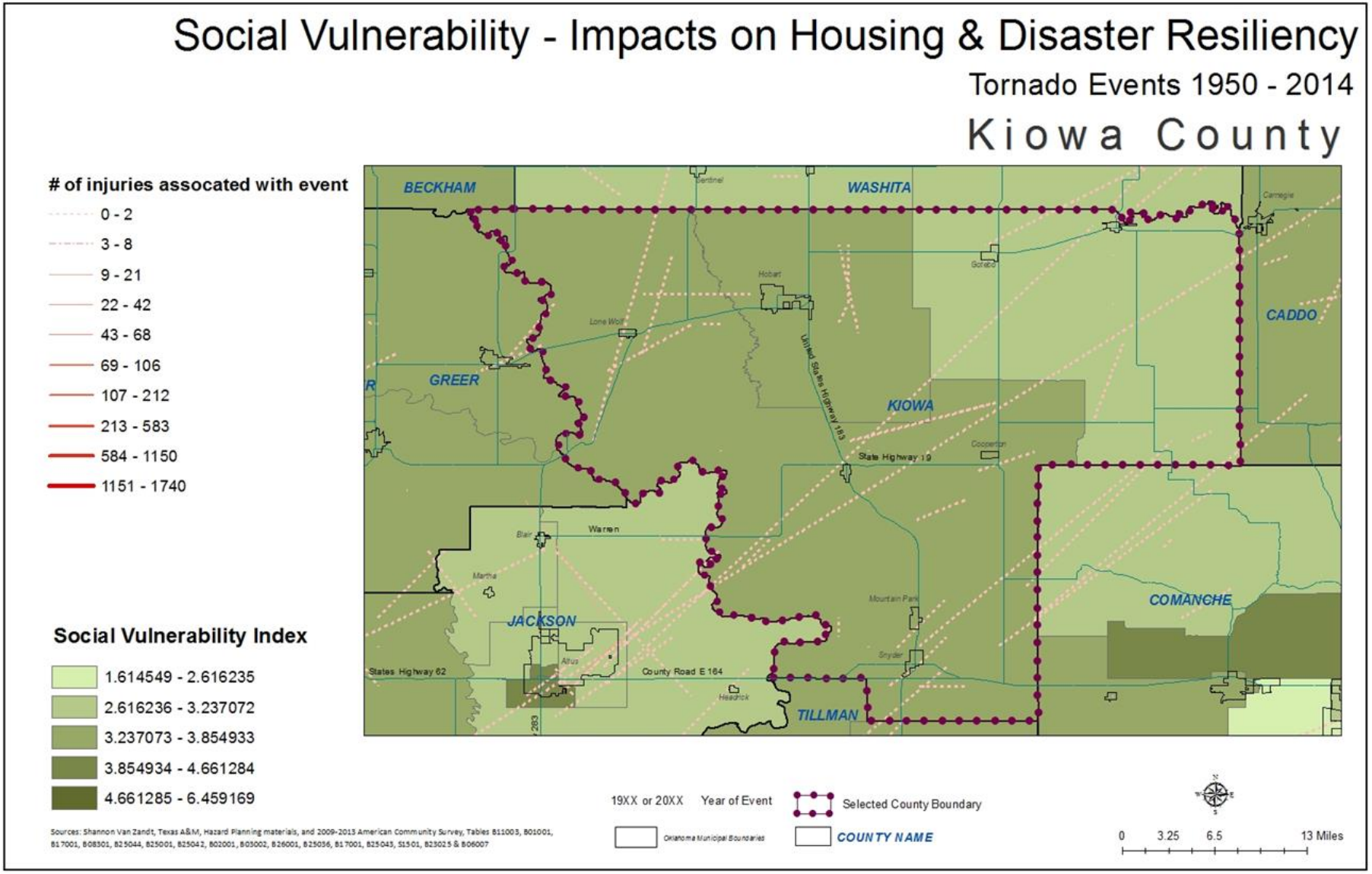
Tornados

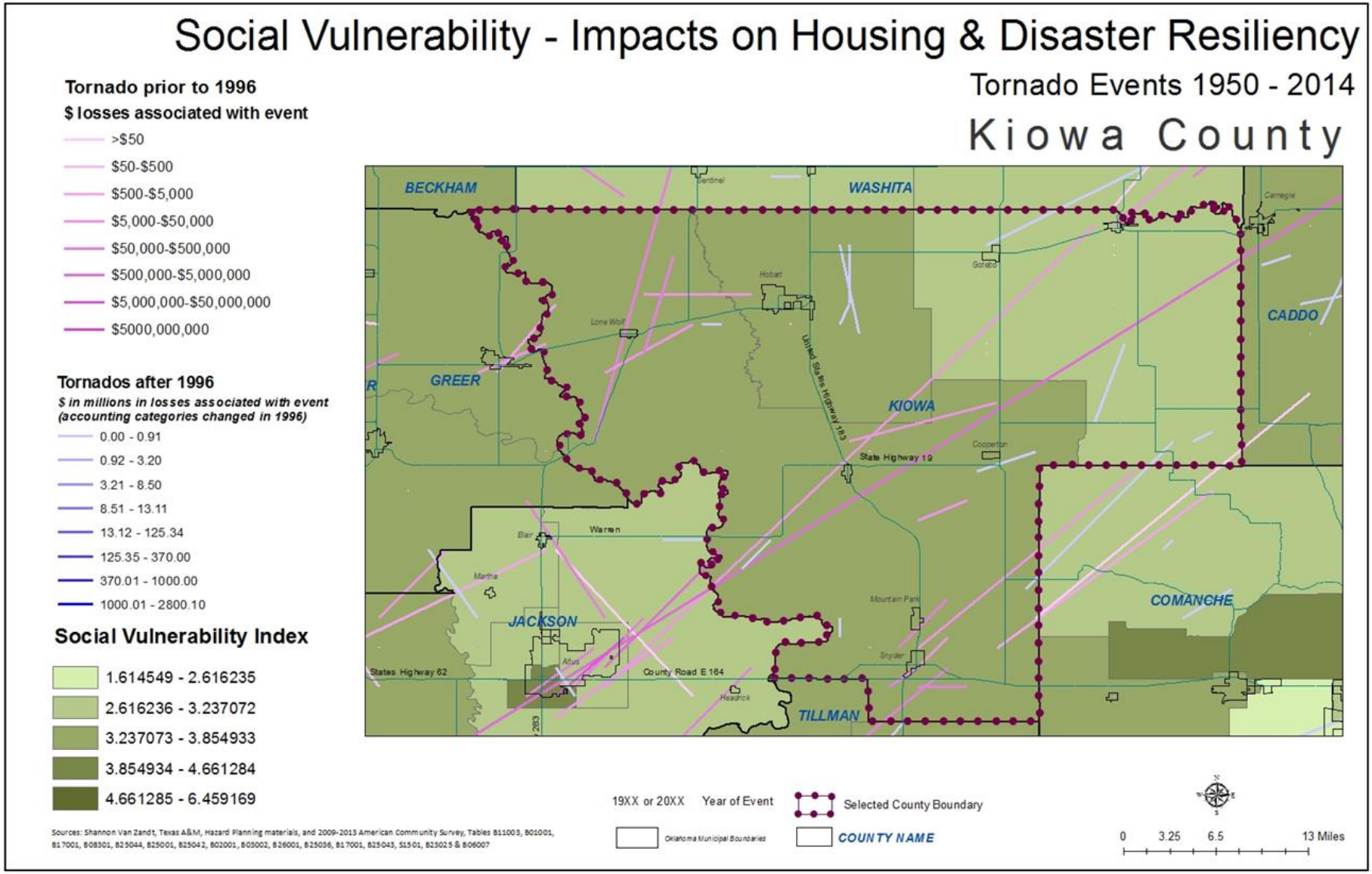
“In the last 13 years Kiowa County and participating jurisdictions had 19 tornado events and, resulting in an average of 1.46 tornado events per year. Therefore the probability of a tornado occurring within the participating jurisdictions each year is highly likely.” (HMP, p46)

NOAA data shows the following historic data on disaster events for the county:

Historic data on tornados between 1950-2014 there are 73 tornados documented. There were 9 injuries that occurred connected to these tornados, with latest injury (one) happening in the 2001 tornado. There were 2 fatalities connected to tornadoes during this time period, one of which occurred in 1971 (the other in 1950). Property losses between 1950-1996 ranged from $858,602.00 to $8,586,100.00 . (The accounting methods used for losses changed in 1996.) The losses estimated between 1996-2014 was $740,000.00 .


Social Vulnerability - Impacts on Housing & Disaster Resiliency
Tornado Events 1950 - 2014
Kiowa County
# of fatalities associated with event
0
1 - 2
3 - 5
6 - 7
8 - 9
10 - 14
15 - 24
25 - 42
43 - 80
81 - 158
BECKHAM
WASHITA
CADDO
GREER
KIOWA
JACKSON
COMANCHE
TILLMAN
Hobart
Lone Wolf
Gotebo
Carnegie
Cooperton
Warren
Blair
Martha
Mountain Park
Snyder
Headrick
Altus
States Highway 62
County Road E 164
State Highway 19
United States Highway 183
Social Vulnerability Index
1.614549 - 2.616235
2.616236 - 3.237072
3.237073 - 3.854933
3.854934 - 4.661284
4.661285 - 6.459169
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
19XX or 20XX Year of Event
Selected County Boundary
Oklahoma Municipal Boundaries
COUNTY NAME
0 3.25 6.5 13 Miles


Social Vulnerability - Impacts on Housing & Disaster Resiliency
Tornado Events 1950 - 2014
Kiowa County
# of injuries assocated with event
0 - 2
3 - 8
9 - 21
22 - 42
43 - 68
69 - 106
107 - 212
213 - 583
584 - 1150
1151 - 1740
Social Vulnerability Index
1.614549 - 2.616235
2.616236 - 3.237072
3.237073 - 3.854933
3.854934 - 4.661284
4.661285 - 6.459169
BECKHAM
WASHITA
CADDO
GREER
KIOWA
COMANCHE
JACKSON
TILLMAN
Hobart
Lone Wolf
Warren
Blair
Martha
Altus
Mountain Park
Snyder
Headrick
Cooperton
Carnegie
Gotebo
Sentinel
States Highway 62
County Road E 164
State Highway 19
United States Highway 183
283
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
19XX or 20XX Year of Event
Selected County Boundary
Oklahoma Municipal Boundaries
COUNTY NAME
0 3.25 6.5 13 Miles


Social Vulnerability - Impacts on Housing & Disaster Resiliency
Tornado Events 1950 - 2014
Kiowa 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
BECKHAM
WASHITA
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Gotebo
Carnegie
Cooperton
Warren
Blair
Martha
Mountain Park
Snyder
Altus
Headrick
States Highway 62
County Road E 164
State Highway 19
United States Highway 183
19XX or 20XX Year of Event
Selected County Boundary
Oklahoma Municipal Boundaries
COUNTY NAME
0 3.25 6.5 13 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 Kiowa HMP recommends:

- Create database on citizens with existing storm shelters.(p. 58)
- Build safe rooms/storm shelters to protect from tornados and high winds (p.58)

C.2.1.3 Public Policy and Governance to Build Disaster Resiliency

Information not available.

C.2.1.4 Local Emergency Response Agency Structure

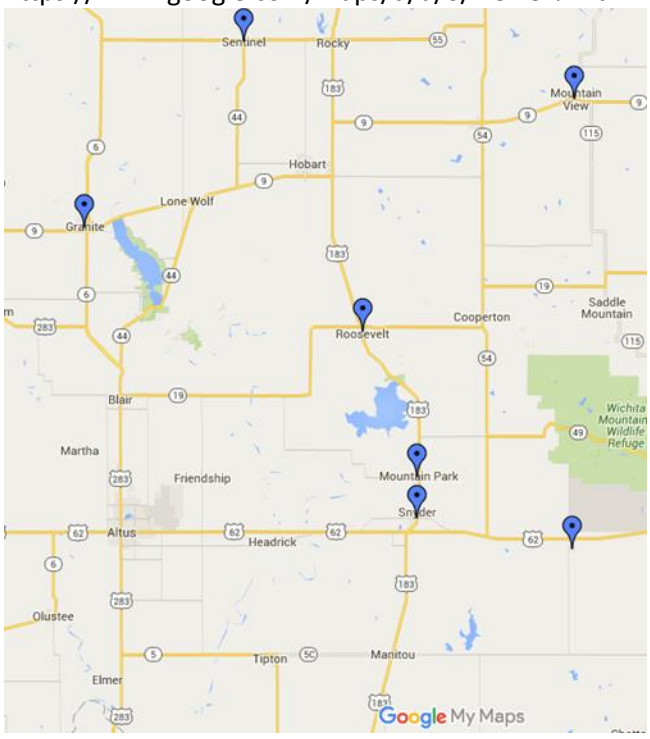
Information not available.

C.2.1.5 Threat & Hazard Warning Systems

The Kiowa HMP recommends:

- Improve Warning Systems (storm sirens, cell phone notification, fire alert, etc.) (p. 58)
- Purchase of storm sirens for Gotebo,Hobart, Lone Wolf, Mt. Park, Mt. View, Roosevelt, Snyder (p.66, 70, 73, 76, 79, 82, 86)

Google Mapped sirens in Oklahoma:
https://www.google.com/maps/d/u/0/viewer?mid=zkgp3PmLxLzg.kXQeGF45FpQg&hl=en



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.

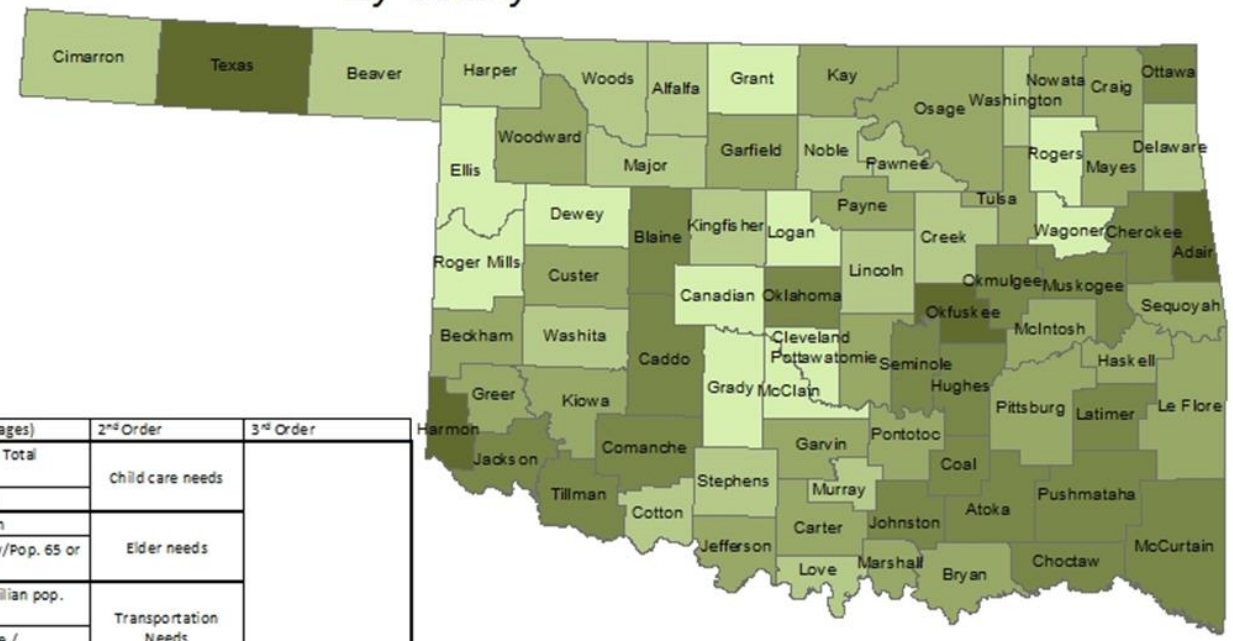
Social Vulnerability Analysis - Kiowa County

Base Social Vulnerability Indicators (%)		2nd Order	3rd Order
1.) Single Parent Households	16.61%	0.228 (Child Care Needs)	**3.395 Social Vulnerability 'Hotspot' or Area of Concern**
2.) Population Under 5	6.24%		
3.) Population 65 or Above	18.46%	0.297 (Elder Needs)	
4.) Population 65 or Above & Below Poverty Rate	11.20%		
5.) Workers Using Public Transportation	1.23%	0.071 (Transportation Needs)	
6.) Occupied Housing Units w/o Vehicle	5.92%		
7.) Housing Unit Occupancy Rate	74.93%	2.554 (Temporary Shelter and Housing Recovery Needs)	
8.) Rental Occupancy Rate	31.99%		
9.) Non-White Population	23.57%		
10.) Population in Group Quarters	2.59%		
11.) Housing Units Built Prior to 1990	91.61%		
12.) Mobile Homes, RVs, Vans, etc.	8.18%		
13.) Poverty Rate	22.57%		
14.) Housing Units Lacking Telephones	3.73%	0.244 (Civic Capacity Needs)	
15.) Age 25+ With Less Than High School Diploma	14.00%		
16.) Unemployment Rate	5.24%		
17.) Age 5+ Which Cannot Speak English Well or Not At All	1.41%		

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

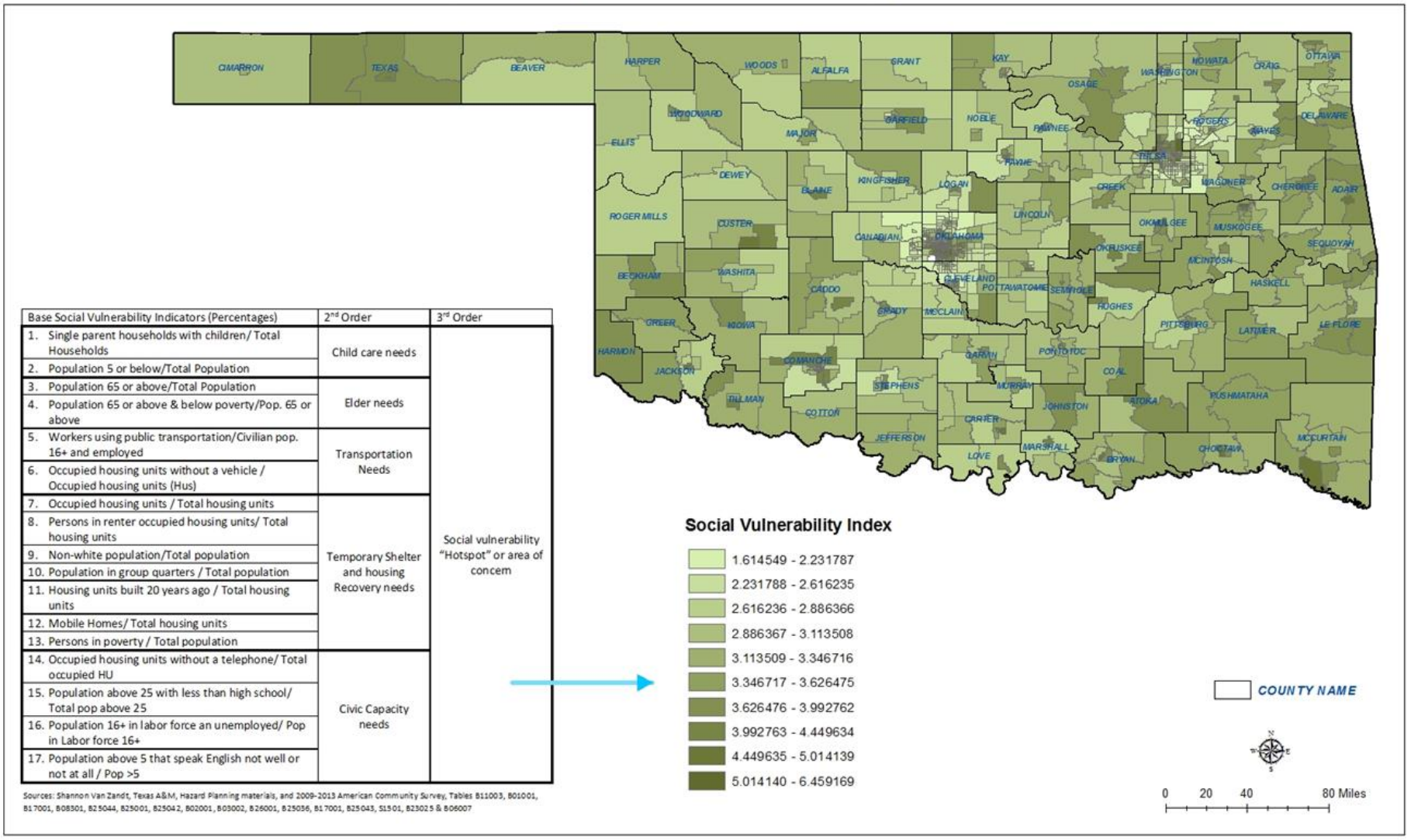


Levels of Social Vulnerability Analysis

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		

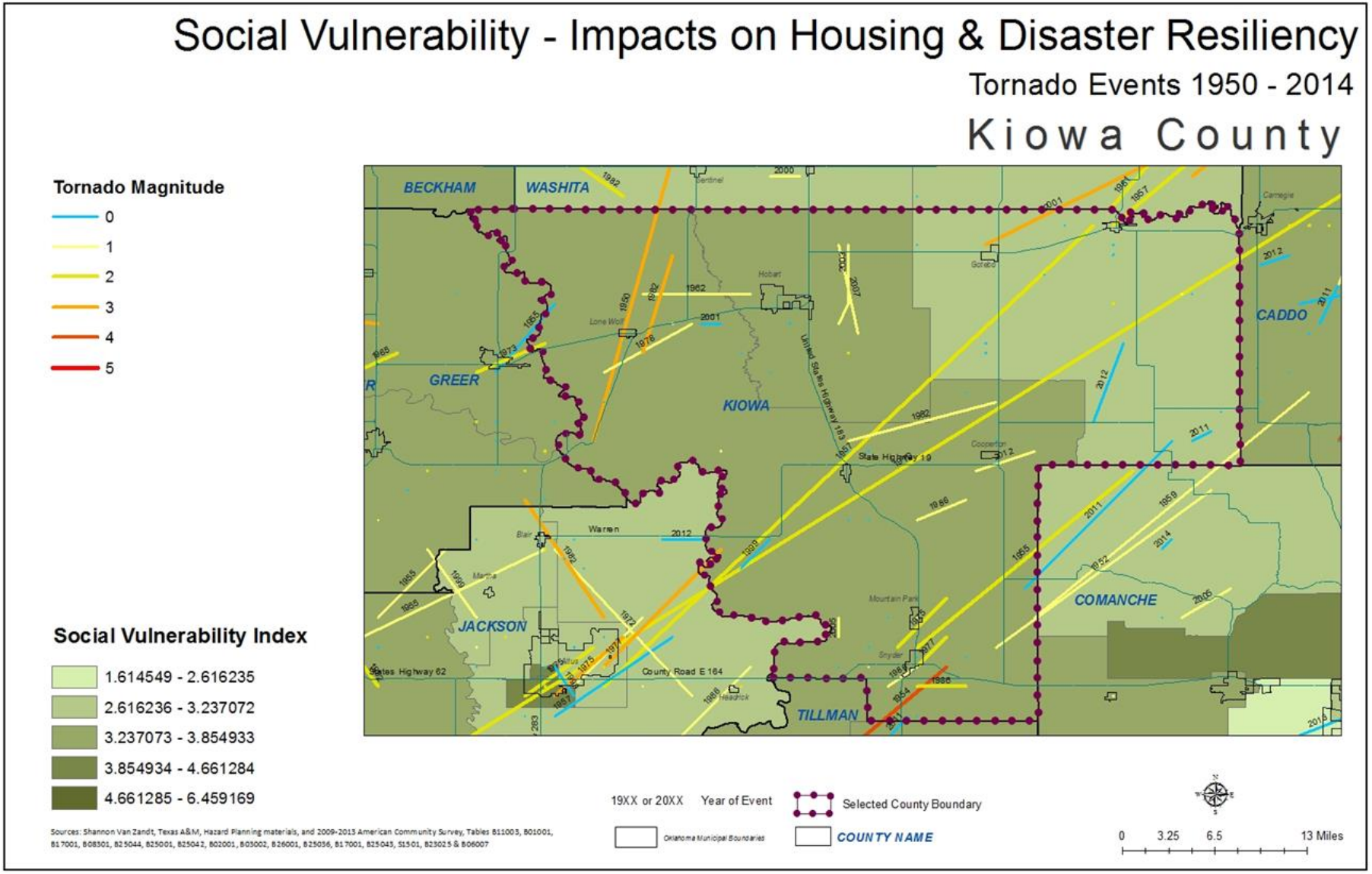
Source: Shannon VanZandt, Texas A&M, Hazard Planning materials; 2009-2013 American Community Survey, Tables B11003, B01001, B17001,

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
Kiowa County
Tornado Magnitude
0
1
2
3
4
5
BECKHAM
WASHITA
GREER
KIOWA
CADDO
JACKSON
COMANCHE
TILLMAN
Warren
Hobart
Mangum
Social Vulnerability Index
1.614549 - 2.616235
2.616236 - 3.237072
3.237073 - 3.854933
3.854934 - 4.661284
4.661285 - 6.459169
19XX or 20XX Year of Event
Selected County Boundary
Oklahoma Municipal Boundaries
COUNTY NAME
0 3.25 6.5 13 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

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 about average per this index for social vulnerability when comparing as a county to other counties in the state. Looking at the census tract level, the western tracts of the county have elevated scores for social vulnerability.

Recommendations for this county:

- Continue to maintain the county HMP and include attention to areas within the county that in addition to physical vulnerability may have compounding social vulnerability factors.
- 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.