

WILDFIRE

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Hazard Description

A wildfire is an uncontrolled fire burning in an area of vegetative fuels such as grasslands, brush, or woodlands. Heavier fuels with high continuity, steep slopes, high temperatures, low humidity, low rainfall, and high winds all work to increase the risk for people and property located within wildfire hazard areas or along the urban/wildland interface. Wildfires are part of the natural management of forest ecosystems, but most are caused by human factors. Texas has seen a huge increase in the number of wildfires in the past 30 years. Years of fire suppression have significantly disturbed natural fire occurrences—nature’s renewal process. The result has been the gradual accumulation of understory and canopy fuels to levels of density that can feed high-energy, intense wildfires and further increase the hazards from and exposure to interface problems.

Location, historical occurrences and probability were determined for wildfires using data products from the Southern Wildfire Risk Assessment (SWRA) project from the Texas Forest Service (TFS). Three datasets were utilized for this section: Historic Fire Locations and Fire Occurrence Area (FOA) data were used to show location and previous occurrences; Communities at Risk to show probability; and Level of Concern (LOC) to show vulnerability.

Location and Historical Occurrences

The FOA is an area where the probability of each acre igniting is the same. The FOA data layer was developed based on historic wildfire ignition data. A FOA is defined as a fire ignition rate measured in Number of Fires divided by 1000 acres over each year.

The Texas Forest Service used Historic Fire Locations (a.k.a. Ignition Locations; Fire Events) for the years 2005 to 2006 to determine fire occurrence areas. In many situations wildfires often occur at the same location (particularly for man-caused fires). The frequency of wildfires per year is modeled to create the FOA data.

Wildfire

Figures 9-1 through 9-12 graphically illustrate the location and historical wildfire occurrence in the CVCOG Region.

Figure 9-1. Location and Historic Wildfire Events for Coke County

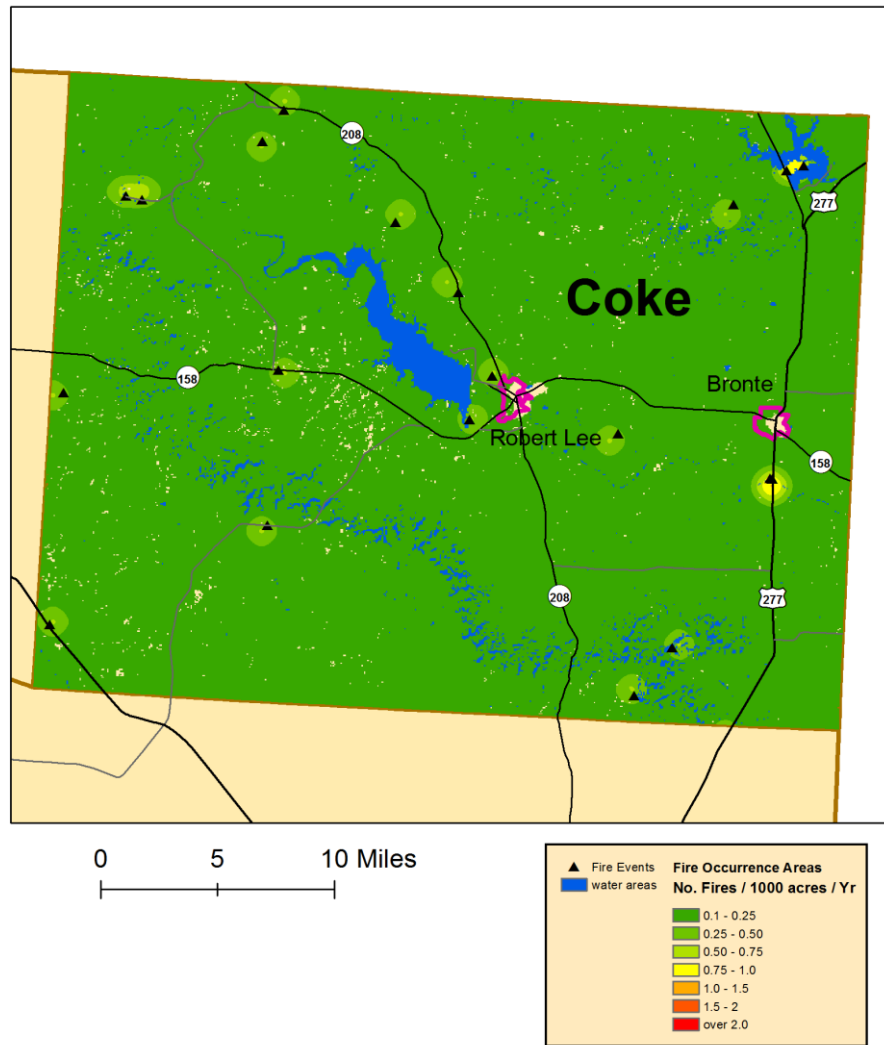


Figure 9-2. Location and Historic Wildfire Events for Concho County

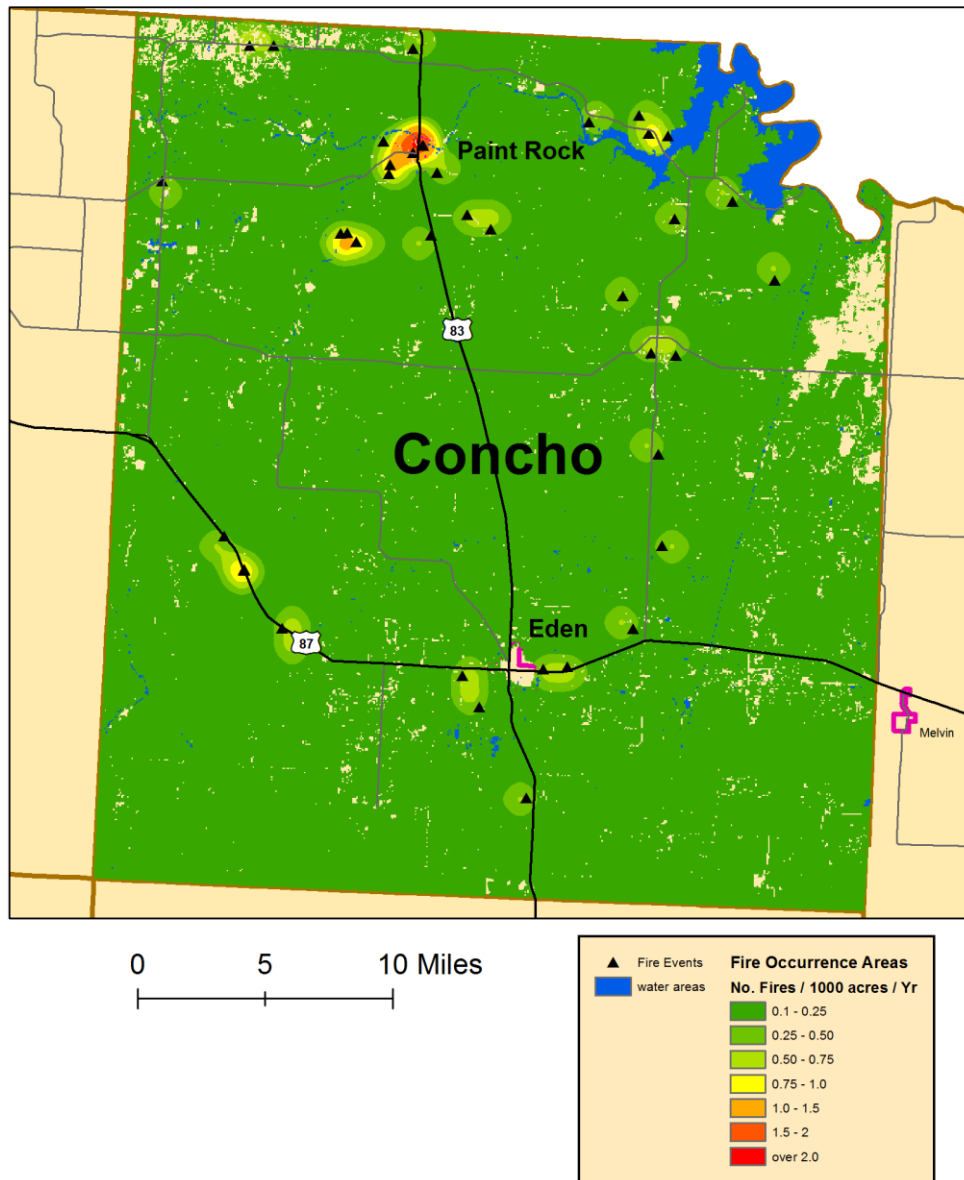


Figure 9-3. Location and Historic Wildfire Events for Crockett County

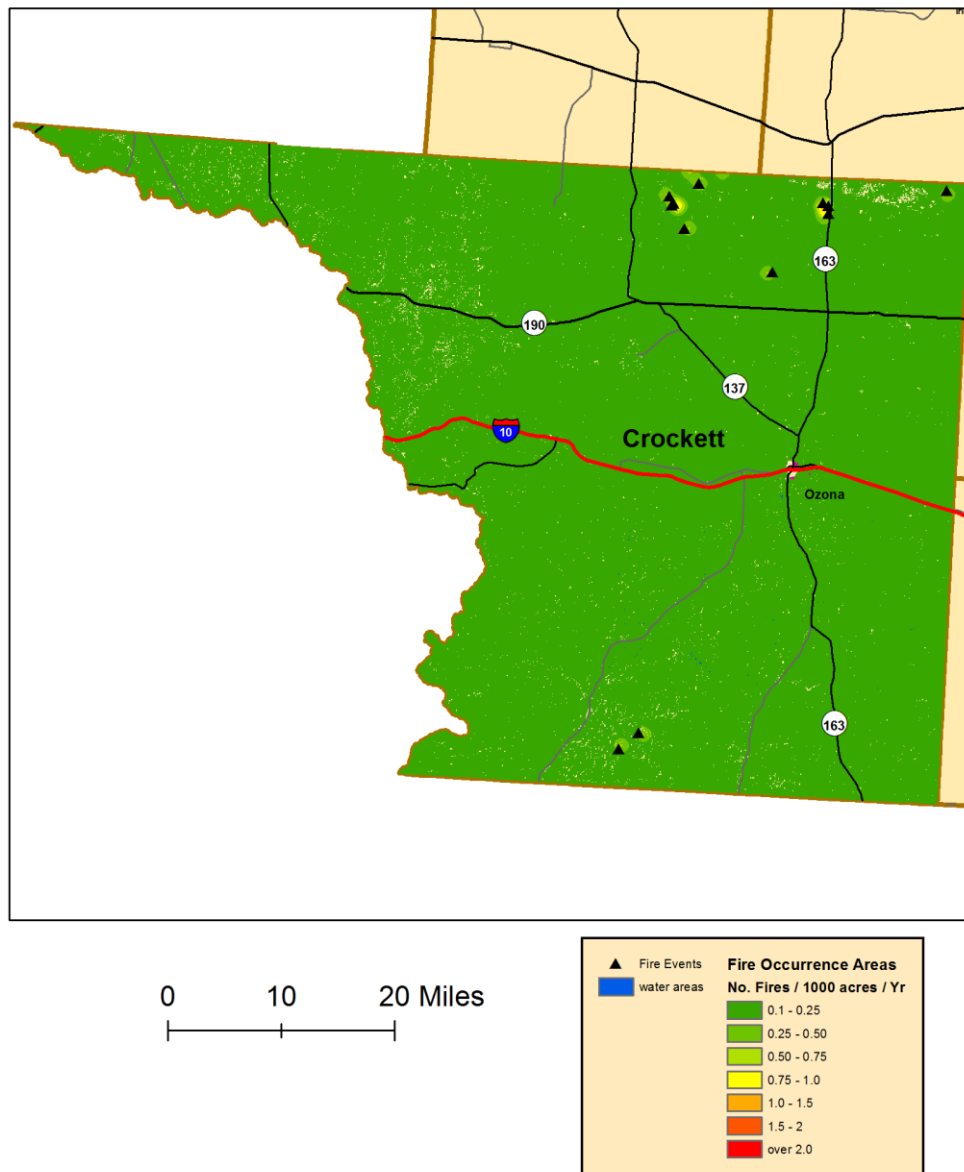


Figure 9-4. Location and Historic Wildfire Events for Irion County

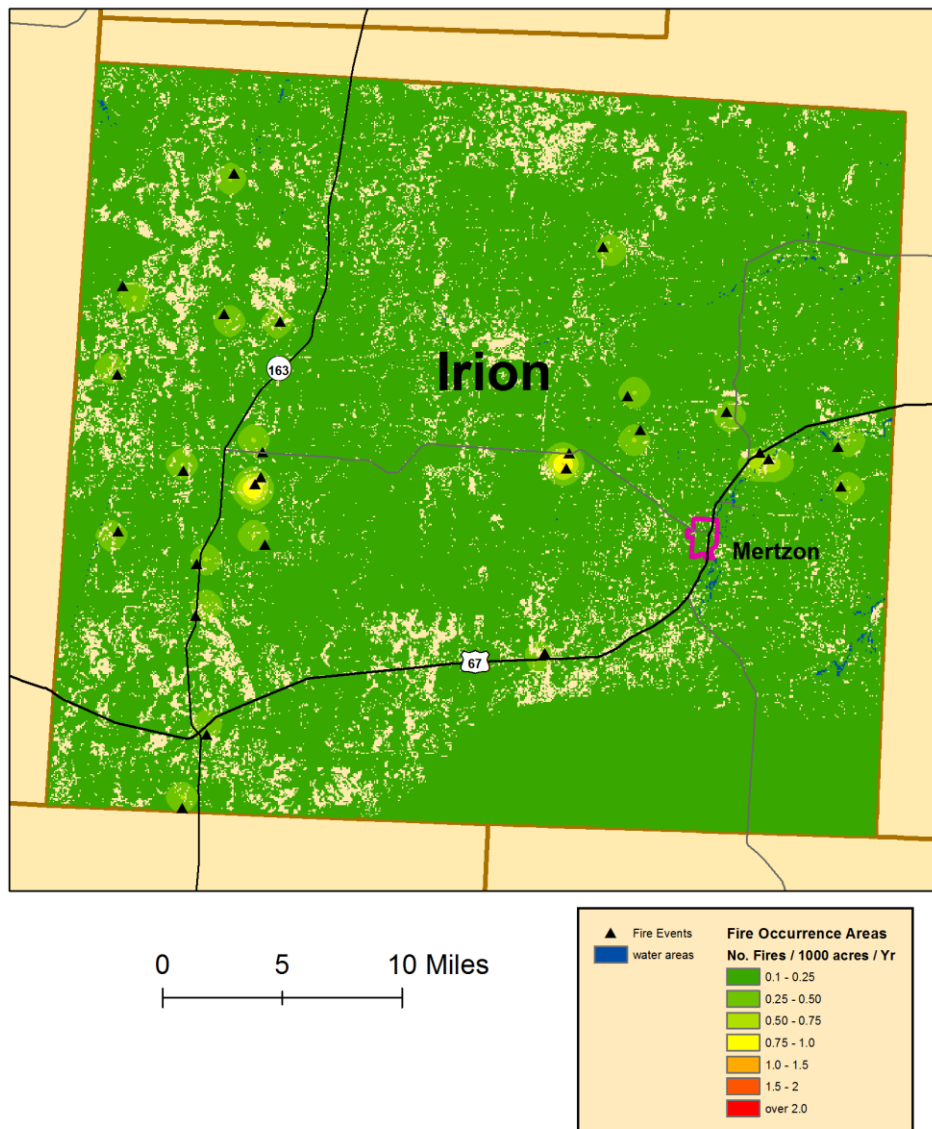


Figure 9-5. Location and Historic Wildfire Events for Kimble County

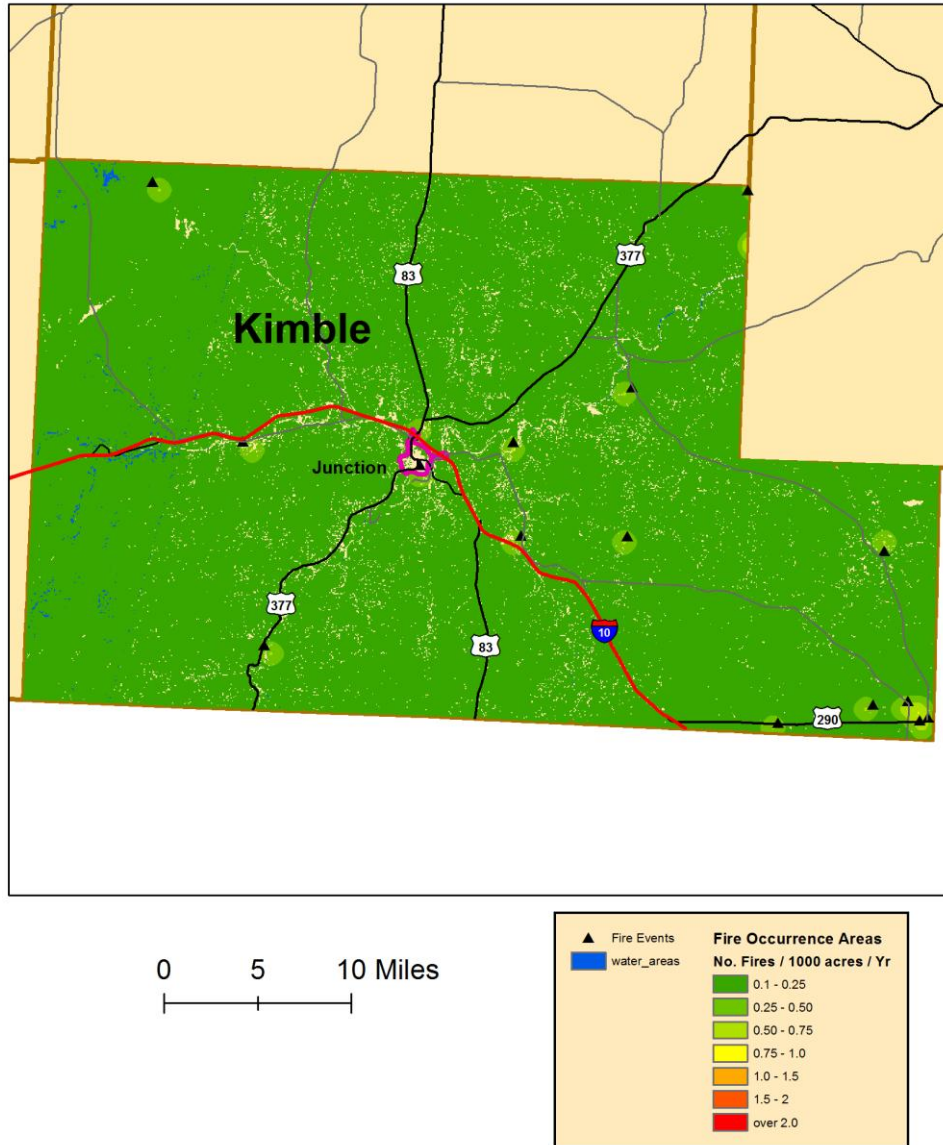


Figure 9-6. Location and Historic Wildfire Events for McCulloch County

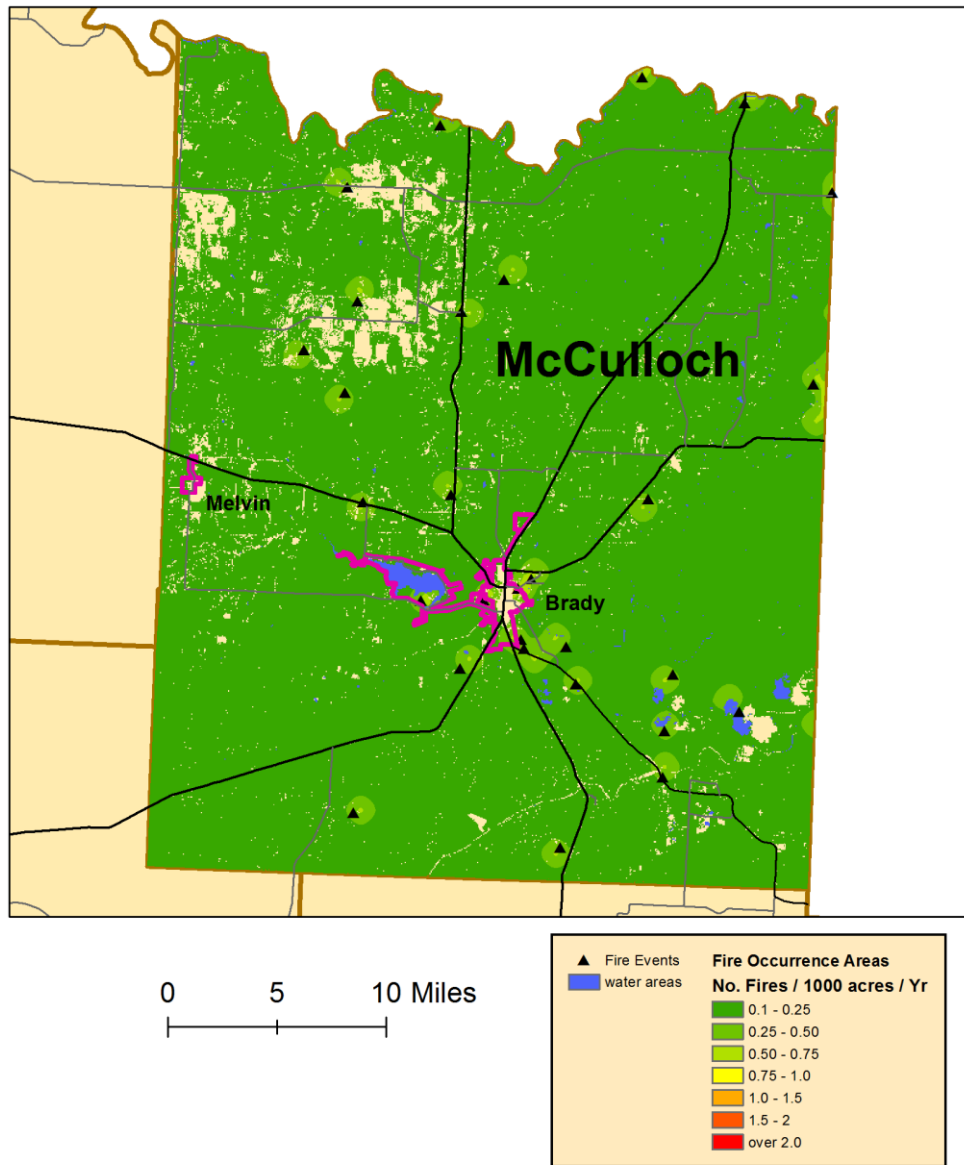


Figure 9-7. Location and Historic Wildfire Events for Menard County

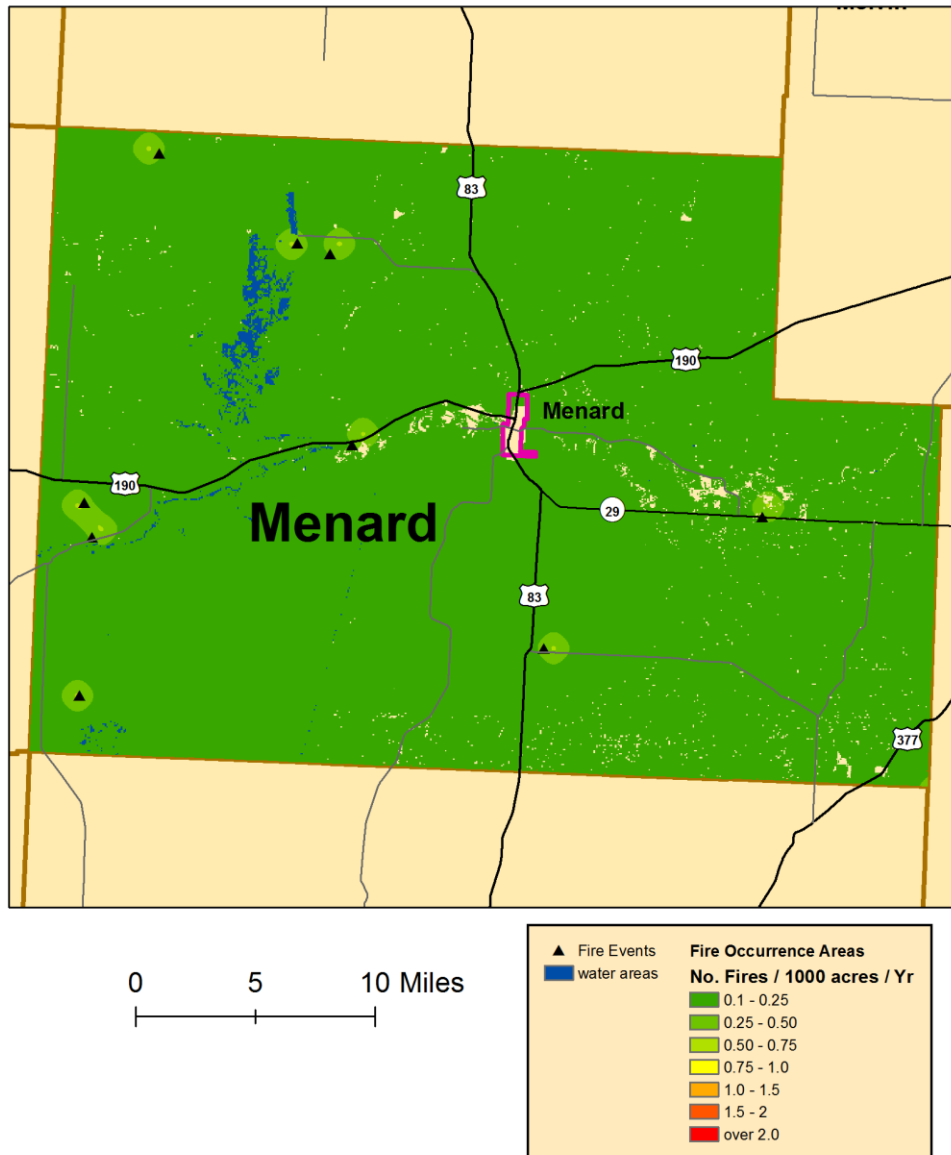


Figure 9-8. Location and Historic Wildfire Events for Reagan County

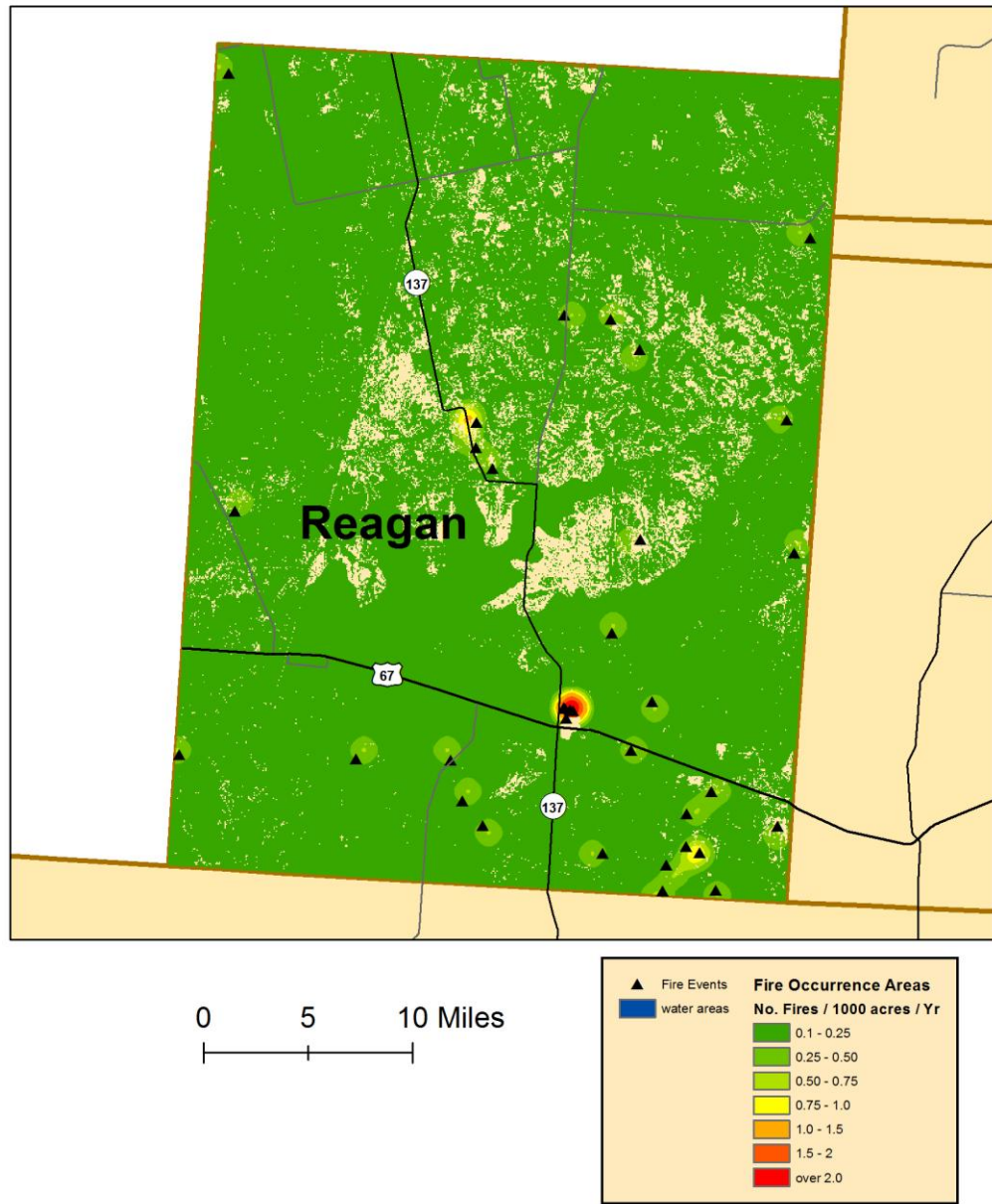


Figure 9-9. Location and Historic Wildfire Events for Schleicher County

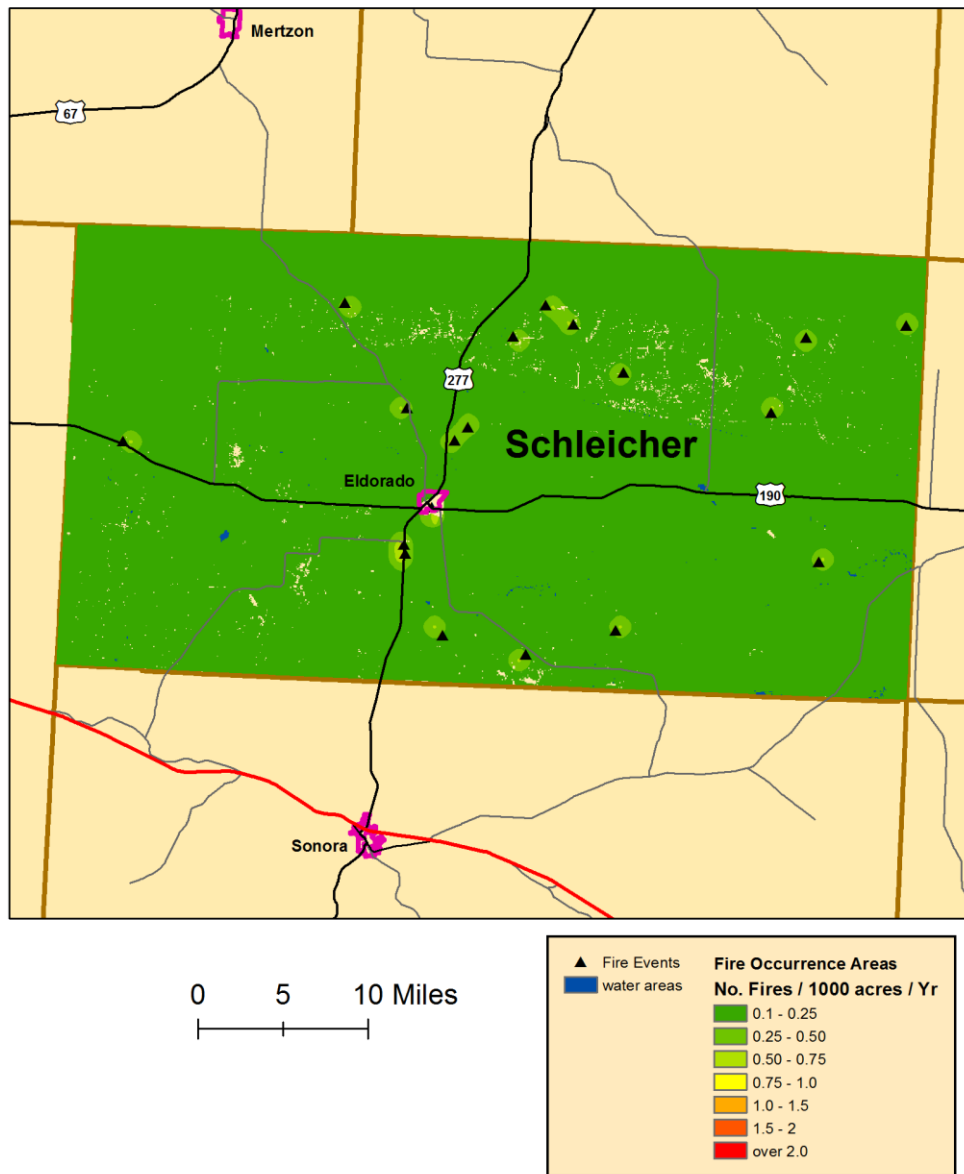


Figure 9-10. Location and Historic Wildfire Events for Sterling County

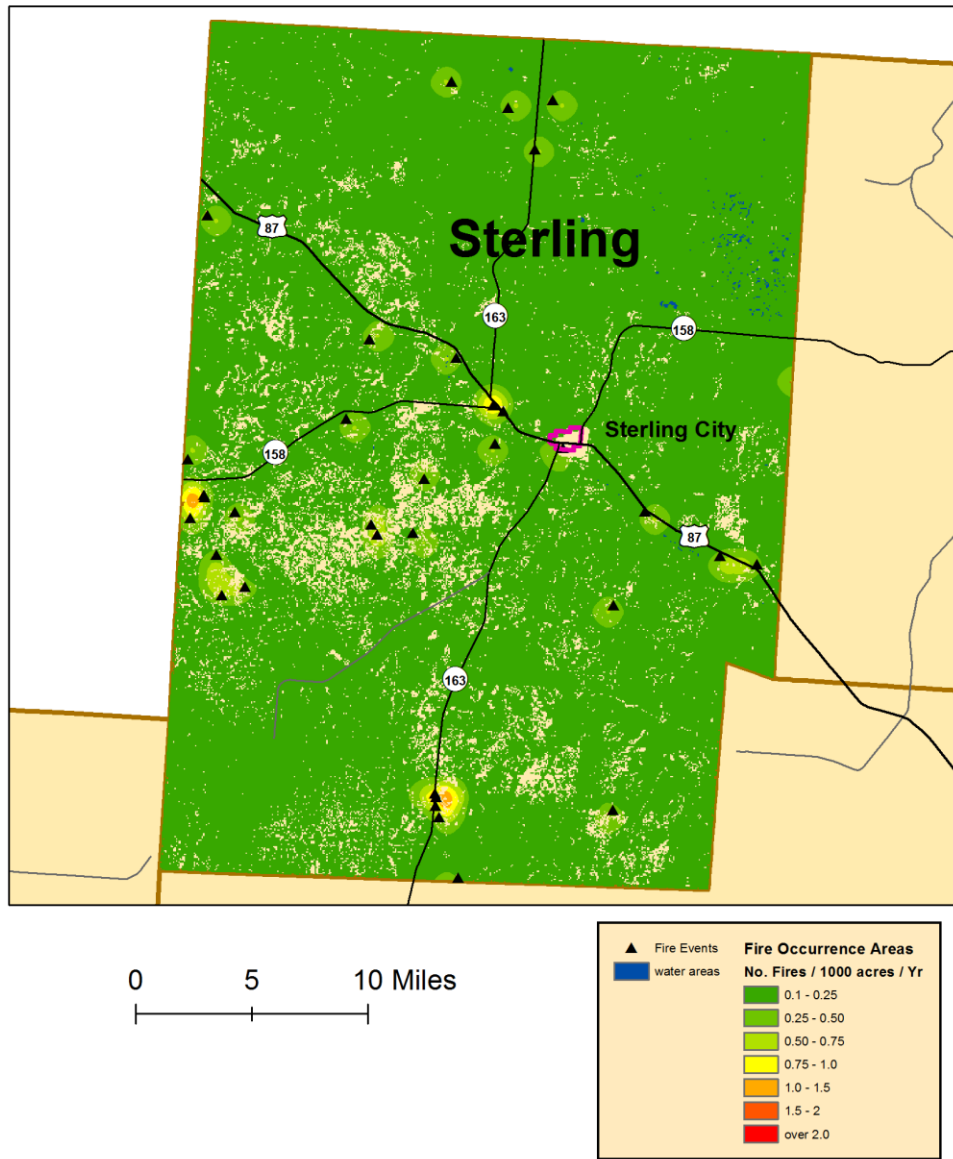


Figure 9-11. Location and Historic Wildfire Events for Sutton County

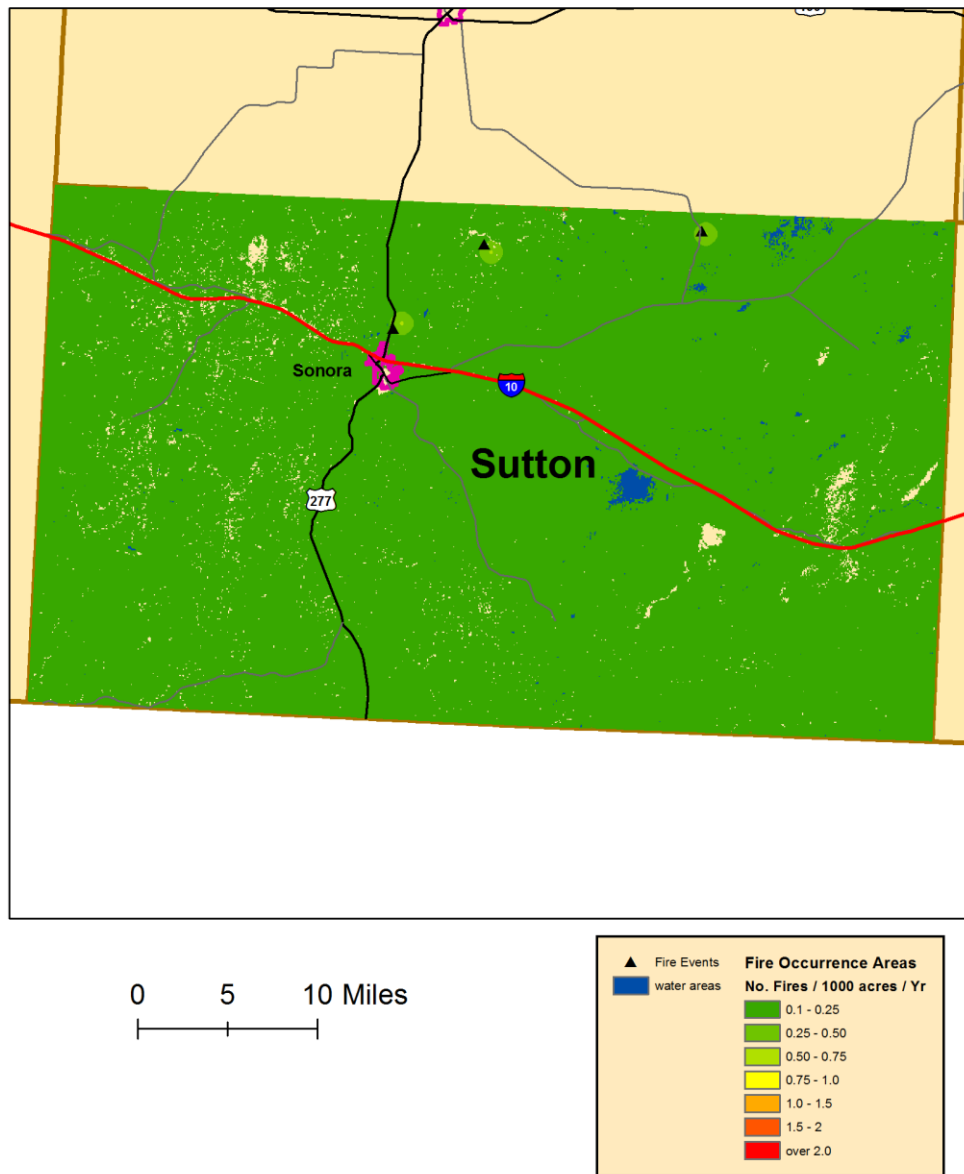
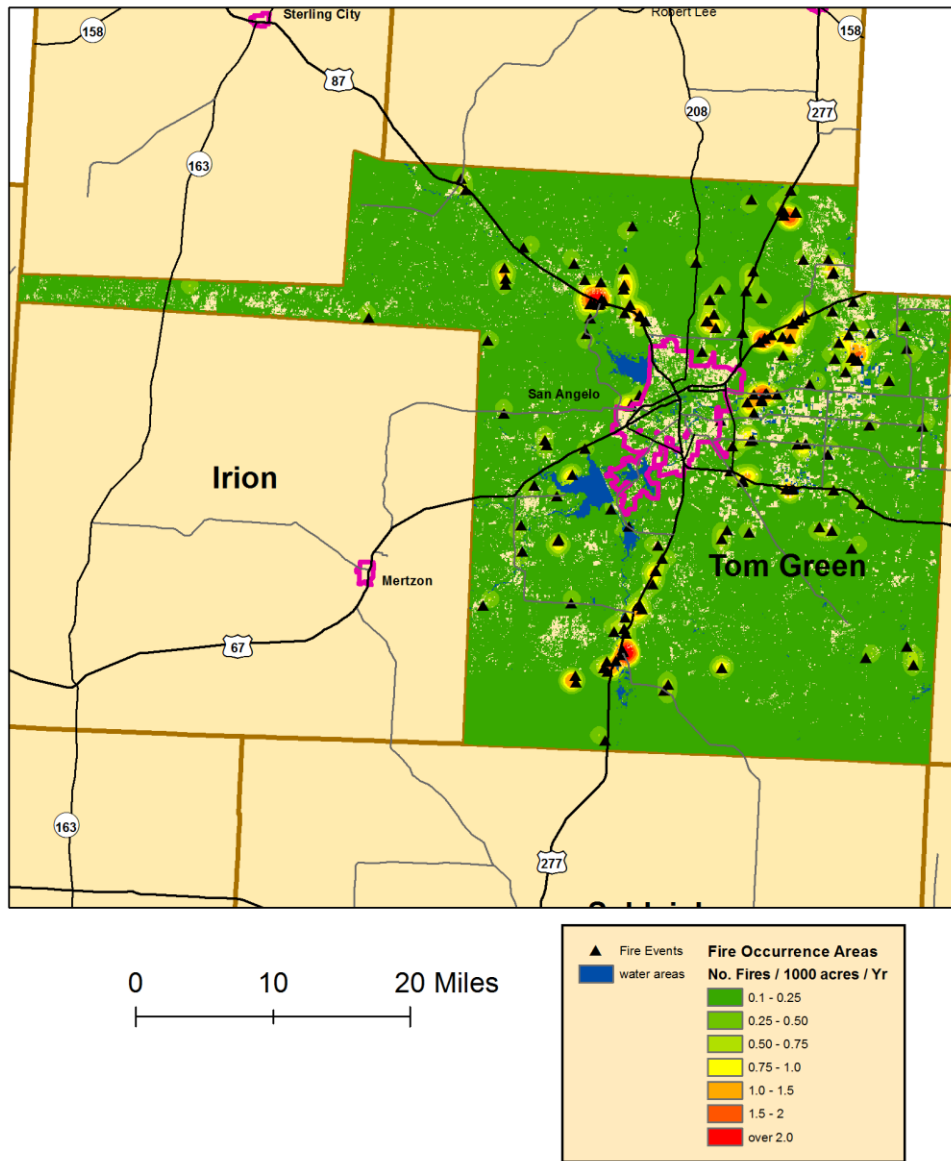


Figure 9-12. Location and Historic Wildfire Events for Tom Green County



Wildfire

The incident records that were included in the SWRA risk assessment were given to the TFS by volunteer fire departments. The reporting of wildfires or other responses to the Forest Service is not required and therefore not all wildfires are represented.

Historical Fire Ignition Locations (Wildfire Events) for all counties are sparse and, in some cases, very sparse. However, this wildfire modeling is in its infancy, and is expected to be updated through a maintenance program, improve over time, and become more reliable.

While modeling provided by TFS is based on incidents reporting in 2005 and 2006, more recent records have been reported to the National Climatic Data Center (NCDC). A total of 44 wildfire incident records at the county level were available from NCDC as shown in Table 9-1 below. Dates range from 1994 to 2011, based on submission by volunteer fire departments.

Table 9-1. Reported Wildfires in the CVCOG Region, 1994-2011

COUNTY	DATE
Coke	6/29/1994
	8/28/1999
	2/25/2008
	4/10/2011
	6/08/2011
Concho	4/25/2011
Crockett	1/29/2008
	2/25/2008
	2/27/2011
	4/11/2011
	4/29/2011
	6/16/2011
	6/20/2011
Irion	1/01/2006
	2/25/2008
	3/26/2009
	2/27/2011
	4/04/2011
	4/26/2011
Kimble	4/26/2011
McCulloch	8/28/1999
	9/05/2000

COUNTY	DATE
	2/24/2007
Menard	8/28/1999
	4/10/2011
Reagan	1/01/2006
Schleicher	8/28/1999
	4/01/2011
Sterling	1/06/2006
	2/24/2007
	2/25/2008
	6/18/2011
Sutton	1/18/2006
	2/24/2007
	3/26/2011
	4/14/2011
Tom Green	12/03/2005
	1/19/2006
	2/17/2011
	4/08/2011
	4/10/2011
	4/10/2011
	6/20/2011
6/20/2011	
Total Incidents Reported	44

Significant Past Events

29 June 1994 – Coke County

Lightning started a wildfire which burned over 3,500 acres and destroyed a hunting camp and a number of fences. Damage was estimated at \$300,000.

1 January 2006 – Reagan County

Record high temperatures (in the mid to upper 70s), very low relative humidity, high winds, and two and a half months without measurable precipitation combined to produce a very active fire weather day. SPC issued a critical fire weather area for West Texas and Southeastern New Mexico in their Day 1 Fire Weather Outlook issued early on January 1st. A grassfire spread to over 40,000 acres in Reagan and Irion Counties on New Year’s Day. Newspapers original reported the cause as sparks from a transformer. Later, a fire

Wildfire

department official in Big Lake reported that a hawk landed on power lines and burst into flames, starting the fire. Because of high winds, recorded high temperatures, and very low relative humidity, it took firefighters three days to contain the wildfire. It was extinguished a couple of days later. One firefighter sustained second degree burns to his face while fighting the fire but was treated and released from a regional burn center. The fire was in mostly open country and thus only a hunting cabin was destroyed. In addition to the major fire in Reagan and Irion Counties, several other small fires scorched West Texas. Both Ector and Midland Counties had fire and fireworks bans in effect for the period between New Year's Eve and January 6, 2006. Several other counties also had fireworks bans in effect for the New Year's holiday. January was a dry month overall. Several other minor fires occurred throughout West Texas, including two along Interstate 20 in Stanton. Smoke from one of these fires reduced visibility on Interstate 20, causing a five car pile-up that resulted in two injuries.

26 April 2011 – Kimble County

The Oasis Pipeline Fire 11 miles south of Junction burned approximately 9,445 acres and it was 80 percent contained. There were 11 structures destroyed, including one home. Also, three vehicles and one bulldozer were destroyed, along with numerous power poles and fence lines. In addition, 20 head of cattle were lost. Commercial air tankers and four MAFFs tankers helped slow the spread of the fire that came within four miles south of Junction. This fire was started by lightning on April 26.

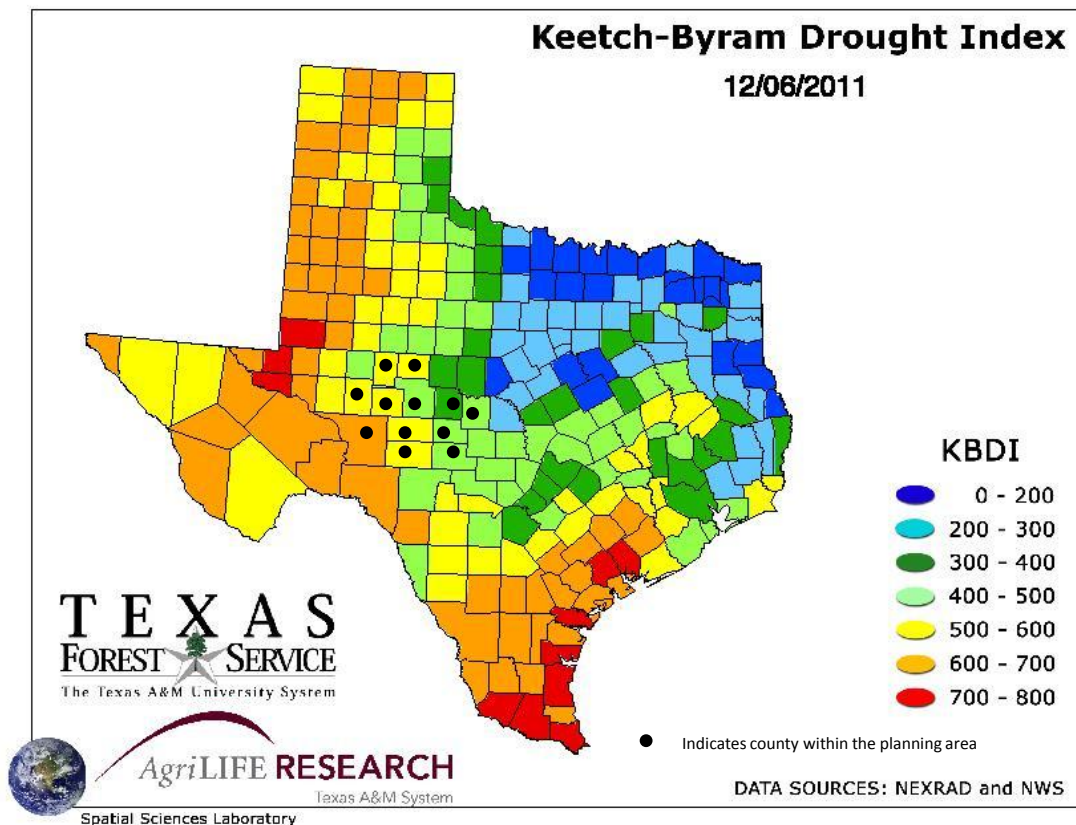
Extent

Wildfire risk is measured in terms of magnitude and intensity using the Keetch-Byram Drought Index (KBDI), a mathematical system for relating current and recent weather conditions to potential or expected wildfire behavior.

The KBDI determines forest fire potential and is based on a daily water balance, where a drought factor is balanced with precipitation and soil moisture (assumed to have a maximum storage capacity of eight inches) and is expressed in hundredths of an inch of soil moisture depletion. Figure 9-13 displays the KBDI for Texas 2011. Counties within the CVCOG Region are denoted by location with a black dot inside the map of Texas in Figure 9-13.



Figure 9-13. KBDI for the State of Texas, 2011



Each color on the map represents the drought index at that location. The drought index ranges from 0 to 800, where a drought index of 0 represents no moisture depletion, and an index of 800 represents absolutely dry conditions.

These numbers correlate with potential fire behavior as follows:

- **0 - 200** Soil and fuel moisture are high. Most fuels will not readily ignite or burn. However, with sufficient sunlight and wind, cured grasses and some light surface fuels will burn in spots and patches.
- **200 - 400** Fires more readily burn and will carry across an area with no gaps. Heavier fuels will still not readily ignite and burn. Expect smoldering and the resulting smoke to carry into and possibly through the night.
- **400 - 600** Fire intensity begins to significantly increase. Fires will readily burn in all directions exposing mineral soils in some locations. Larger fuels may burn or smolder for several days creating possible smoke and control problems.

- **600 - 800** Fires will burn to mineral soil. Stumps will burn to the end of underground roots and spotting will be a major problem. Fires will burn thorough the night and heavier fuels will actively burn and contribute to fire intensity.

From the illustration in Figure 9-13, the counties within the CVCOG Region currently fall within a scale of 300-700, with the majority at a KBDI of 500 to 600. In a period of extreme heat or drought, the KBDI could be over 500 for the area. Table 9-2 provides information on the average, maximum and minimum KBDI for each county participating in the CVCOG Plan Update. This table should be read in conjunction with the current KBDI index in determining the potential magnitude of a wildfire event. Because the KBDI is a measure of the current readiness of fuels for wildfire, caution should be exercised in dryer, hotter conditions, and the KBDI should be referenced as the area experiences changes in precipitation and soil moisture.

Table 9-2. Extent for Wildfire by County¹

COUNTY	AVERAGE KBDI	MAXIMUM KBDI	MINIMUM KBDI
Coke	533	635	391
Concho	316	495	179
Crockett	644	756	343
Irion	593	664	492
Kimble	415	572	264
McCulloch	422	504	307
Menard	430	520	273
Reagan	523	653	275
Schleicher	511	699	282
Sterling	588	706	424
Sutton	501	658	269
Tom Green	484	660	315

Probability of Future Events

Wildfires can occur at any time of the year. Climatic conditions, such as severe freezes and drought can significantly increase the intensity of wildfires since these conditions kill vegetation, creating a prime fuel source for these types of fires. The intensity of fires and the rate at which they spread are directly related to wind speed, temperature and relative humidity.

¹ Source: Texas Forest Service

Wildfire

Based on the 44 incident records that occurred within the 17 year period (1994 to 2011), the probability of future wildfire events is highly likely, with an event probable within the next year.

The Communities at Risk (CAR) maps produced by the SWRA project are shown in Figures 9-14 to 9-22 to follow. A map was created for each participating county in the CVCOG Region except for Crockett, Menard, and Reagan Counties where no data was produced by SWRA. These risk scores give indication of probability of future wildfire events and they were derived by averaging the Wildland Fire Susceptibility Index (WFSI) value for each community, including a buffer zone around the community. This tool is useful in two ways. First, communities can be categorized based on their level of risk, which can aid in identifying the location where more detailed fire planning may be needed. Second, users are able to identify and prioritize those areas (not communities necessarily) where tactical analyses, mitigation activities, and community interaction may be necessary to reduce risk from wildfire.

The WFSI is also a product of the SWRA project. It is a value between 0 and 1, and was developed consistent with the mathematical calculation process for determining the probability of an acre burning. The WFSI integrates the probability of an acre igniting and the expected final fire size based on the rate of spread in four weather percentile categories into a single measure of wildland fire susceptibility.

Figure 9-14. Communities at Risk from Wildfire: Coke County



Figure 9-15. Communities at Risk from Wildfire: Concho County



Figure 9-16. Communities at Risk from Wildfire: Irion County

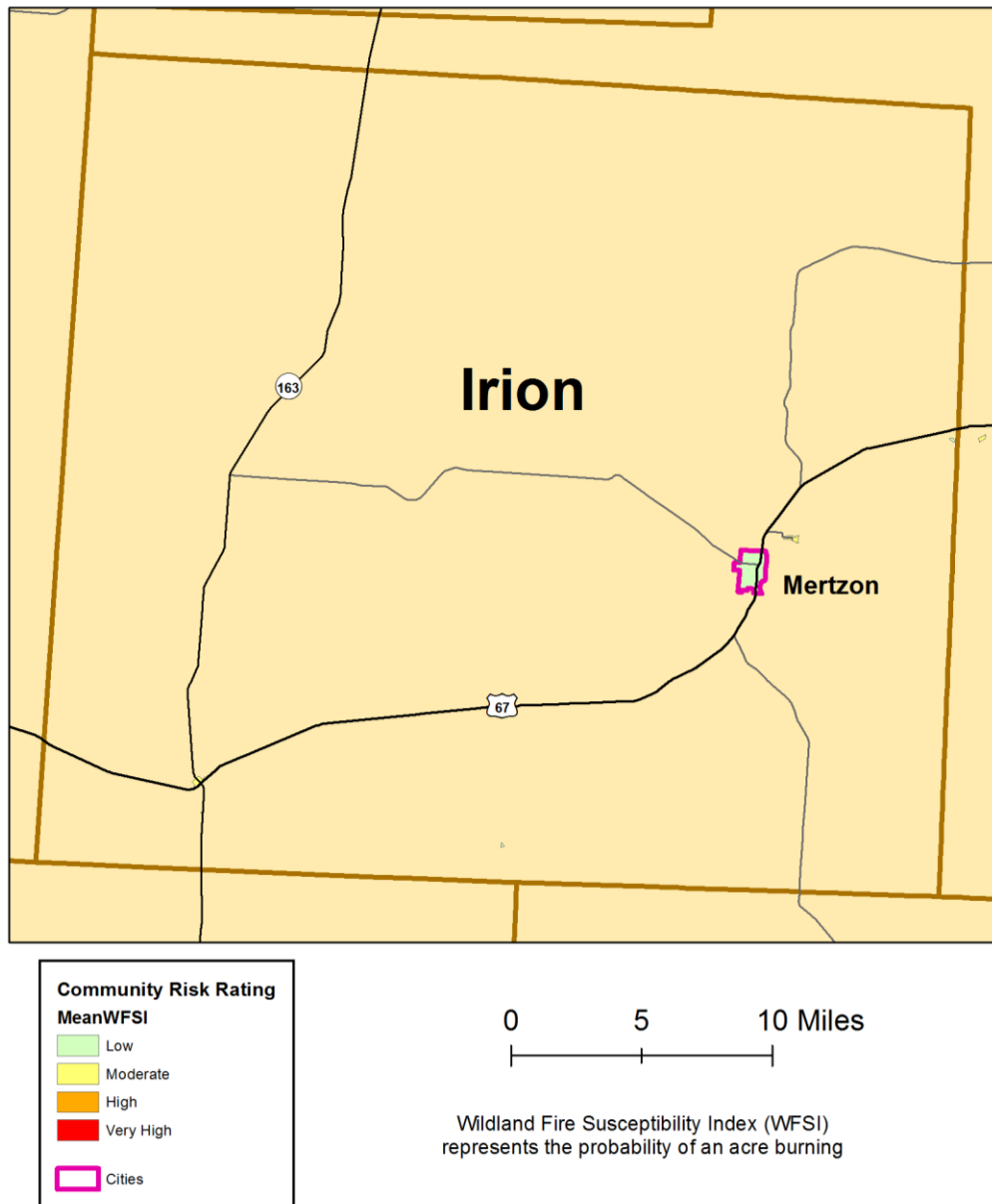
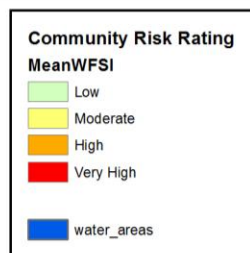
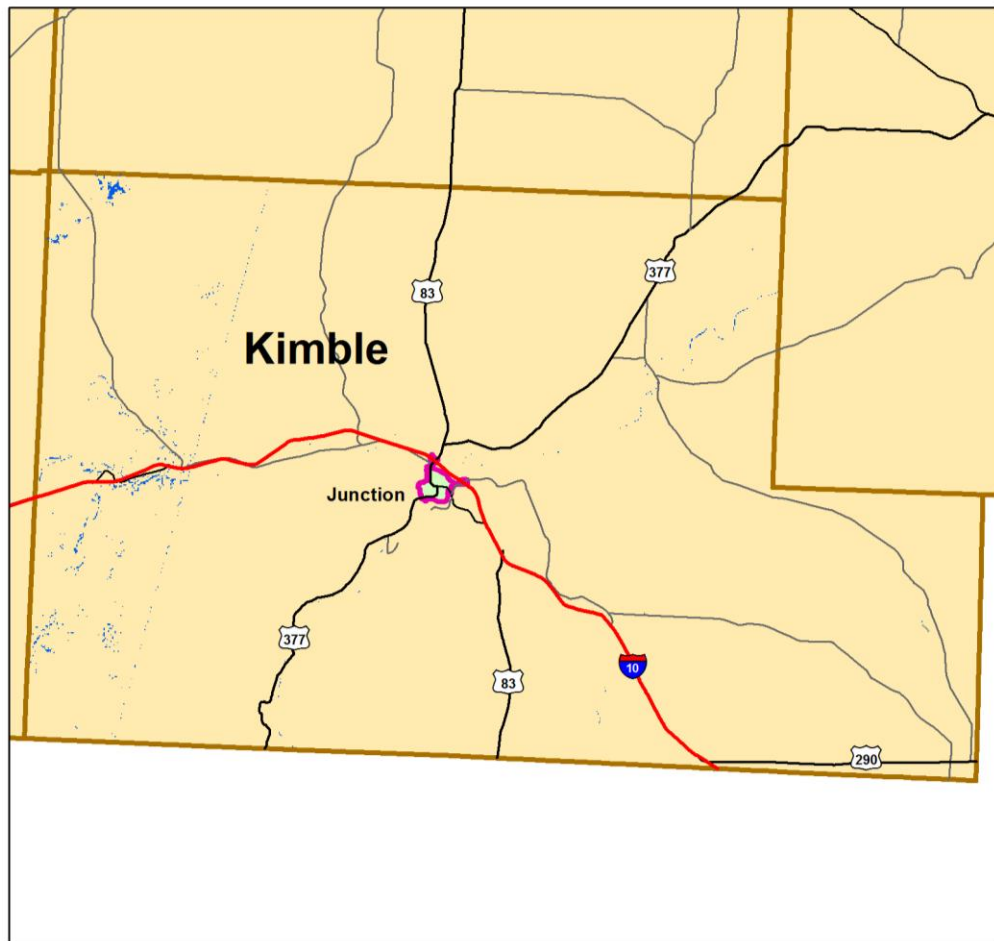


Figure 9-17. Communities at Risk from Wildfire: Kimble County



Wildland Fire Susceptibility Index (WFSI) represents the probability of an acre burning

Figure 9-18. Communities at Risk from Wildfire: McCulloch County

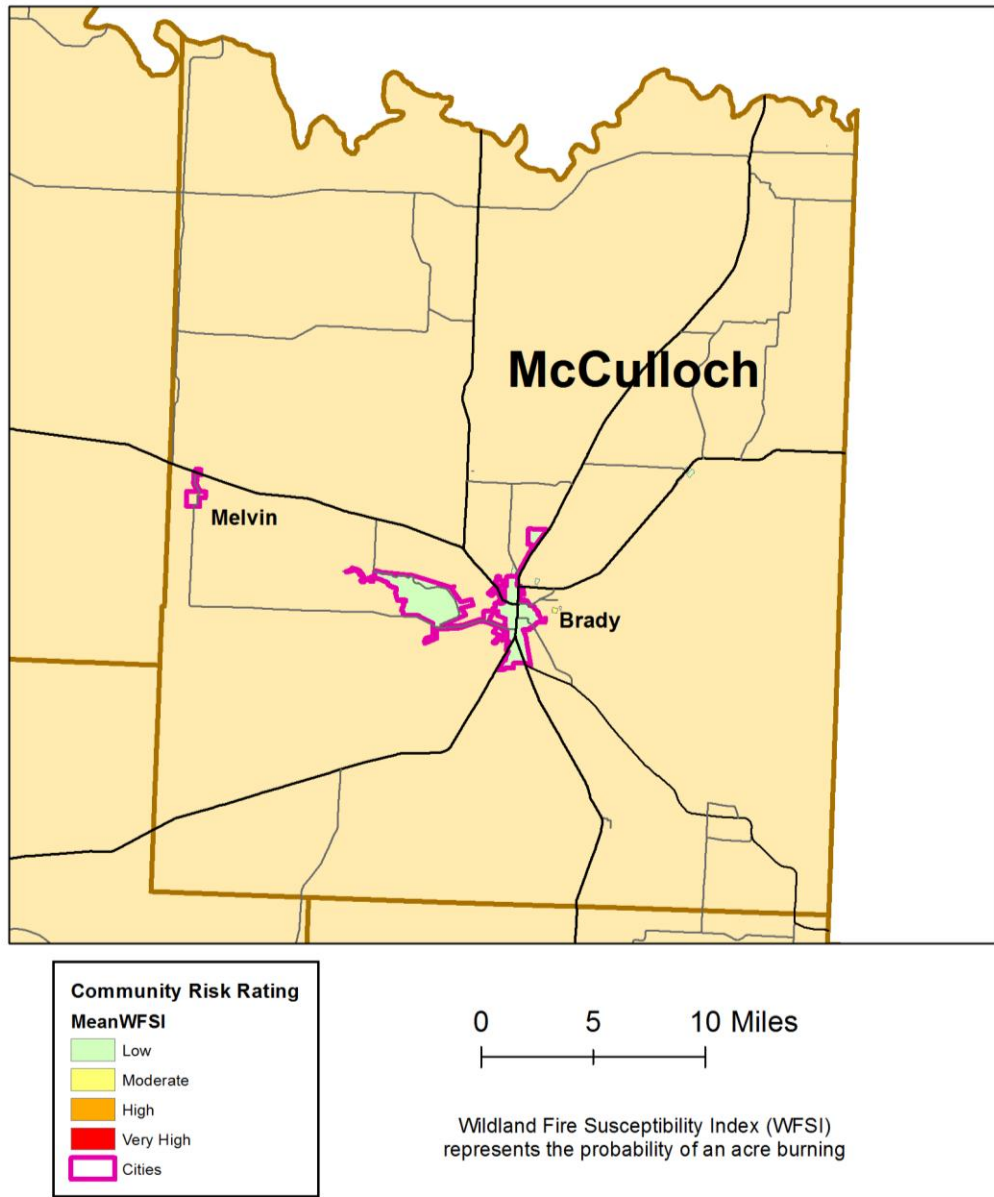


Figure 9-19. Communities at Risk from Wildfire: Schleicher County

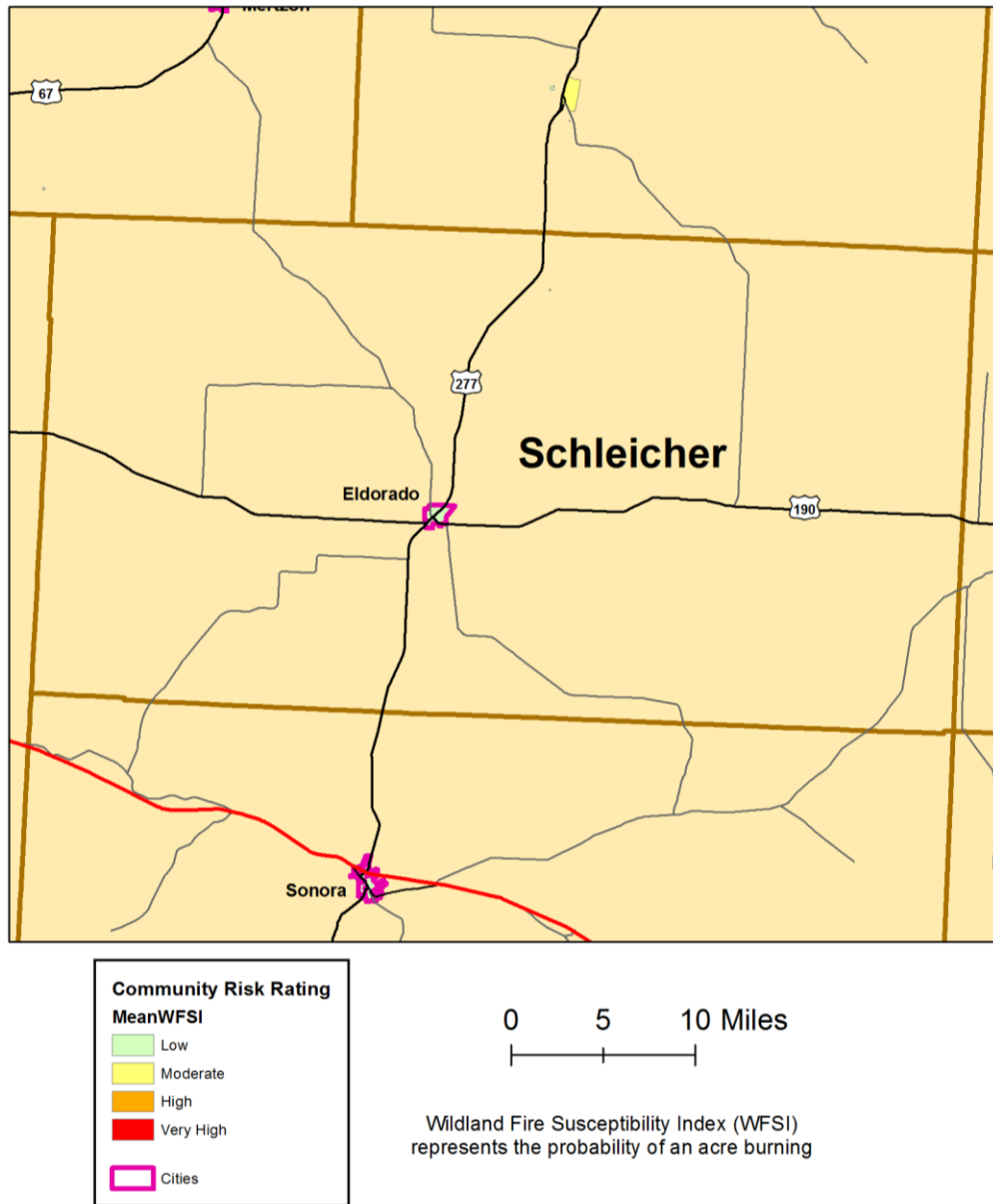


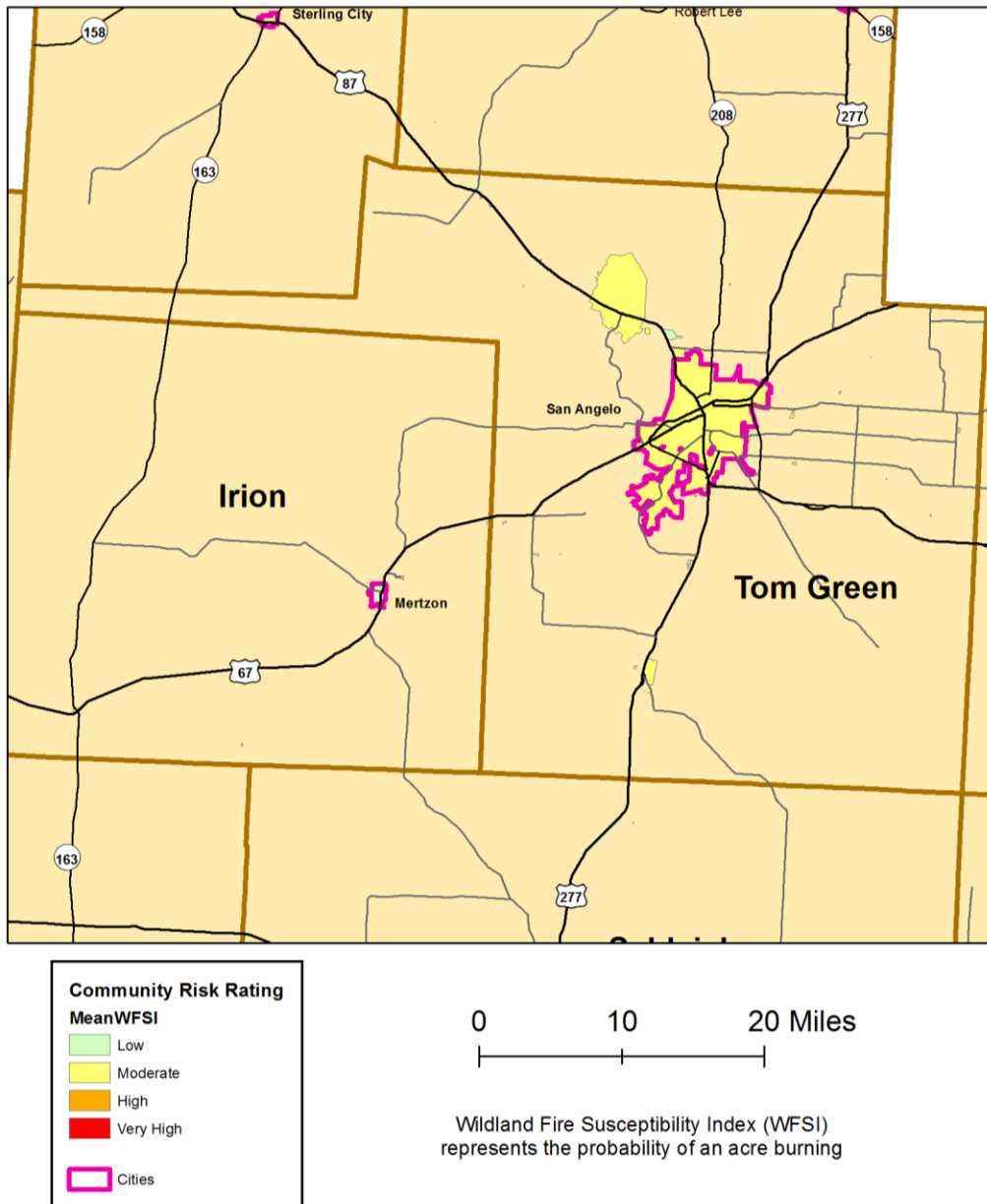
Figure 9-20. Communities at Risk from Wildfire: Sterling County



Figure 9-21. Communities at Risk from Wildfire: Sutton County



Figure 9-22. Communities at Risk from Wildfire: Tom Green County



Vulnerability and Impact

Wildfire hazard areas mapped by SWRA are shown in Figures 9-23 to 9-34. These maps provide a qualitative idea of vulnerability. The Level of Concern (LOC) is a value between 0 and 100. It is calculated as the Wildland Fire Susceptibility Index (WFSI) times the Fire Effects Index (FEI). The overall level of concern for wildfire is located mostly along the perimeter of the jurisdiction where wildland and urban areas interface. It is one of the two primary outputs and is a measure of wildfire risk. The LOC can be used to: identify areas where mitigation options may be of value; allow agencies to work together and better define priorities; develop a refined analysis of a complex landscape and fire situations using GIS; and increase communication with local residents to address community priorities and needs.

Approximate annualized losses were derived by dividing the adjusted total dollar amount reported by each county by the number of years (17) that the NCDC database was recording wildfire events and associated damages. The annualized estimates included in this risk assessment are intended to provide an understanding of relative risk. Table 9-3 below summarizes NCDC reported losses and associated annual loss estimates based on historic reported damages.

The risk of wildfire varies by month, depending on the climate, and warning time for wildfire events is often minimal or none. The severity of impact of major wildfire events can be major. Such events can cause serious injury and shut down facilities for at least two weeks.

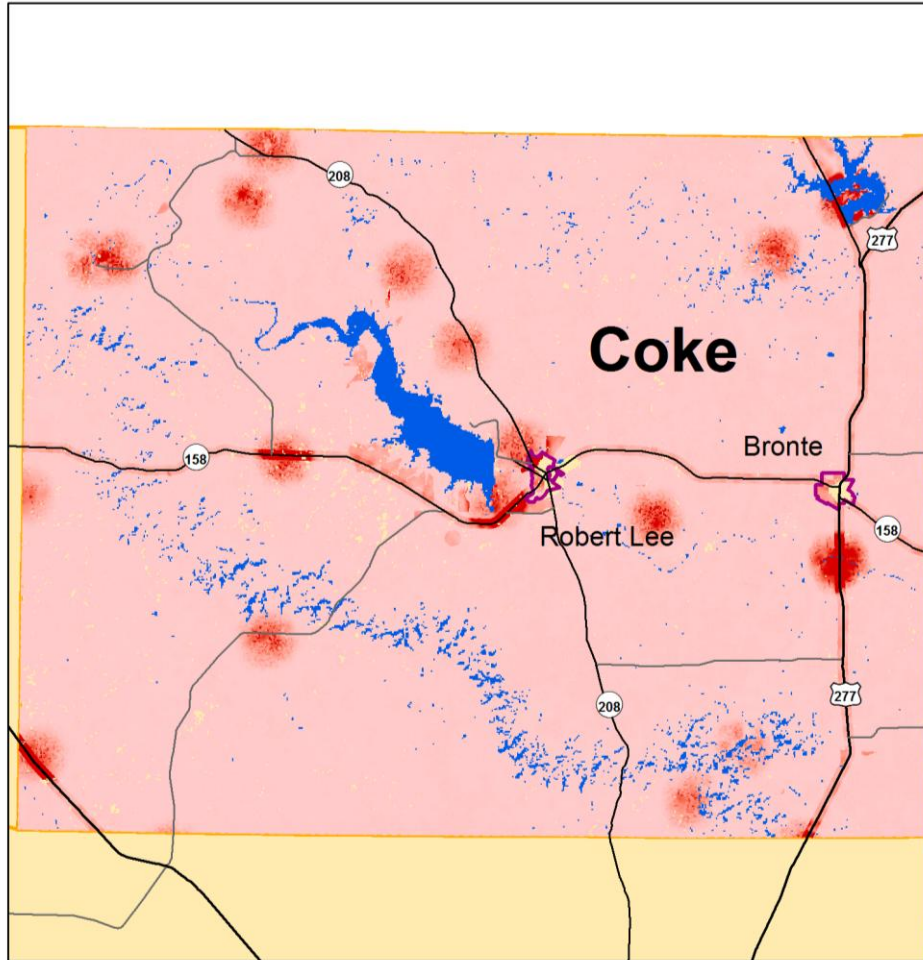
Table 9-3. Loss Estimates in the CVCOG Region

COUNTY	NUMBER OF EVENTS	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE	TOTAL DAMAGES	ANNUAL LOSSES
Coke	4	0	0	\$502,000	\$0	\$502,000	\$29,529
Concho	1	0	0	\$0	\$5,000	\$5,000	\$294
Crockett	5	0	0	\$200,000	\$0	\$200,000	\$11,765
Irion	6	0	1	\$0	\$0	\$0	\$0
Kimble	1	0	0	\$350,000	\$0	\$350,000	\$20,588
McCulloch	3	0	0	\$11,000	\$0	\$11,000	\$647
Menard	2	0	0	\$2,000	\$0	\$2,000	\$118
Reagan	1	0	1	\$15,000	\$1,300,000	\$1,315,000	\$77,353
Schleicher	2	0	0	\$10,000	\$0	\$10,000	\$588
Sterling	3	0	1	\$0	\$0	\$0	\$0
Sutton	4	0	0	\$0	\$0	\$0	\$0
Tom Green	6	0	0	\$210,000	\$0	\$210,000	\$12,

Wildfire

COUNTY	NUMBER OF EVENTS	DEATHS	INJURIES	PROPERTY DAMAGE	CROP DAMAGE	TOTAL DAMAGES	ANNUAL LOSSES
TOTALS	38	0	3	\$1,300,000	\$1,305,000	\$2,605,000	\$3,910,000

Figure 9-23. Overall Wildfire Risk (Level of Concern): Coke County



0 5 10 Miles

Level of Concern (LOC) represents the overall wildfire risk. It is calculated by Wildland Fire Susceptibility Index (WFSI) * Fire Effects Index (FEI)

Level of Concern
WFSI * FEI

High

Low

water areas

Figure 9-24. Overall Wildfire Risk (Level of Concern): Concho County

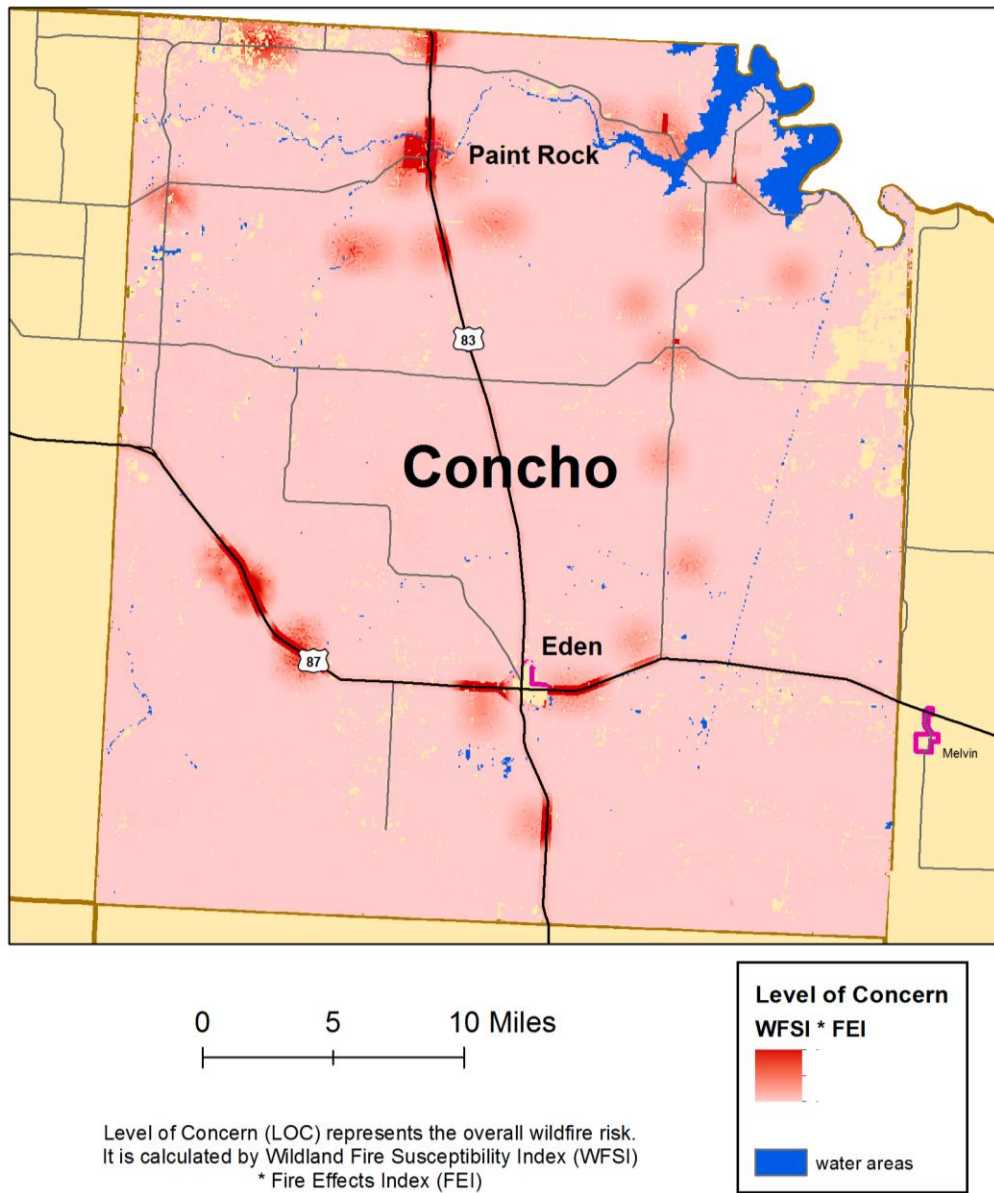
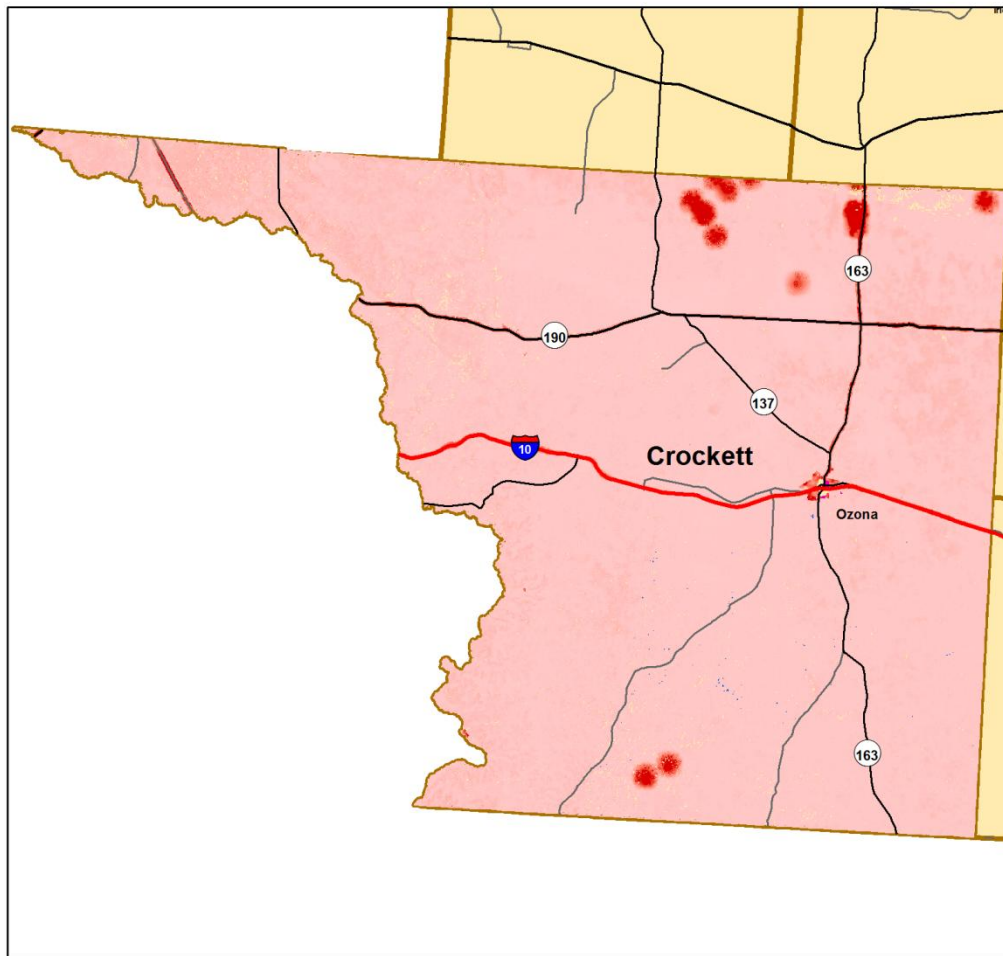


Figure 9-25. Overall Wildfire Risk (Level of Concern): Crockett County



0 10 20 Miles

Level of Concern (LOC) represents the overall wildfire risk. It is calculated by Wildland Fire Susceptibility Index (WFSI) * Fire Effects Index (FEI)

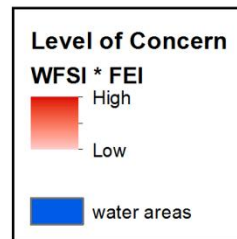


Figure 9-26. Overall Wildfire Risk (Level of Concern): Irion County

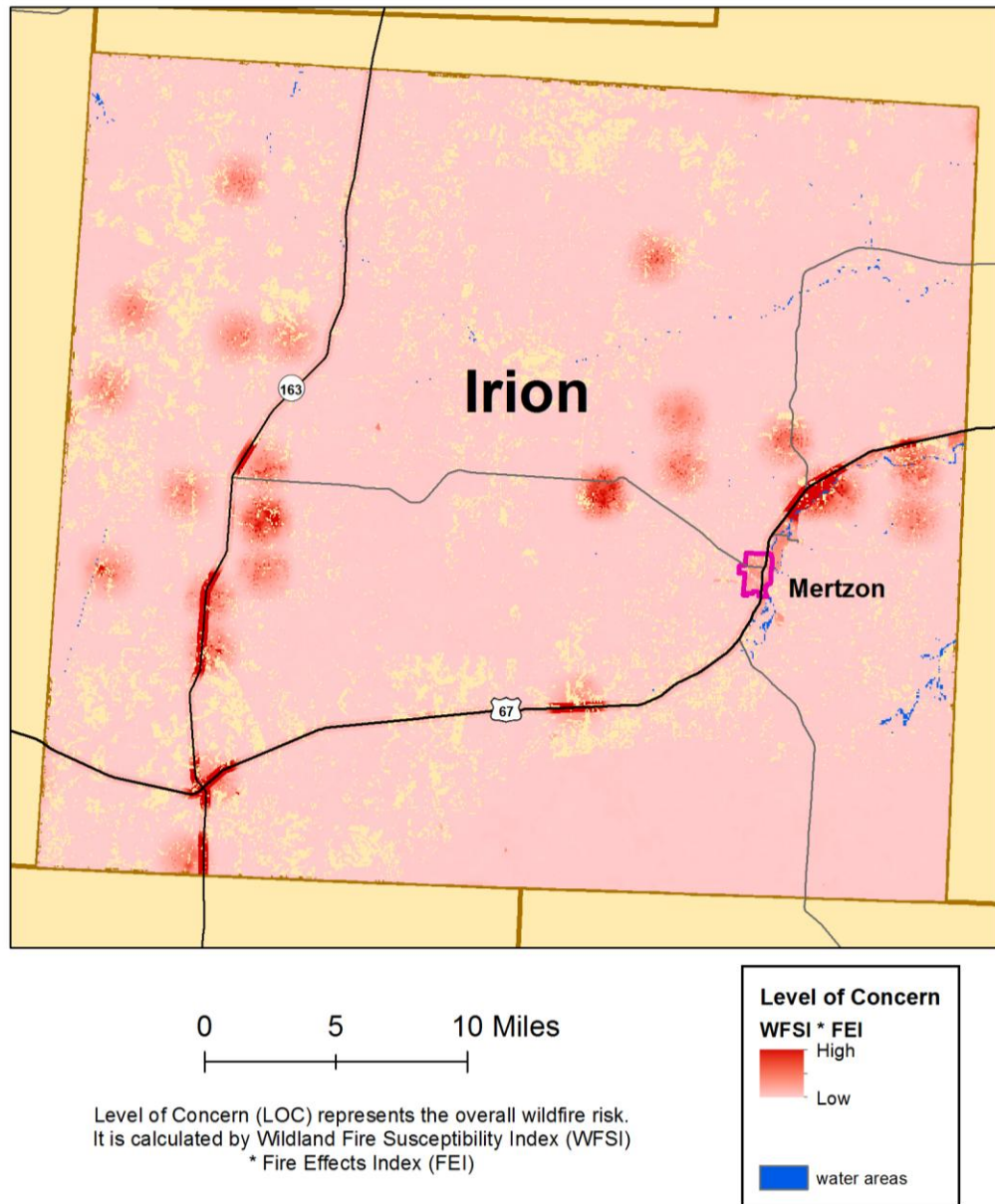
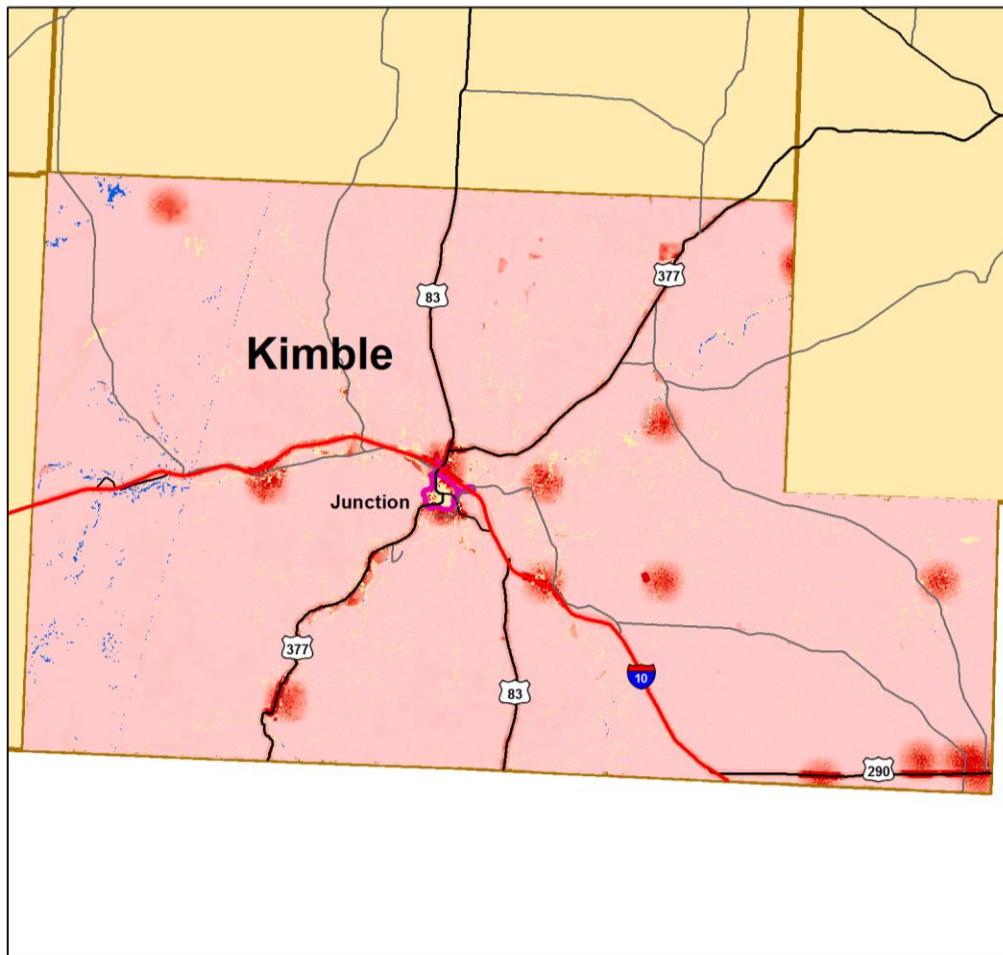


Figure 9-27. Overall Wildfire Risk (Level of Concern): Kimble County



0 5 10 Miles

Level of Concern (LOC) represents the overall wildfire risk.
It is calculated by Wildland Fire Susceptibility Index (WFSI)
* Fire Effects Index (FEI)

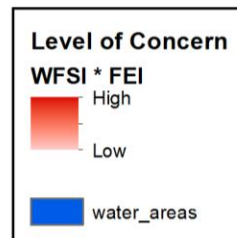


Figure 9-28. Overall Wildfire Risk (Level of Concern): McCulloch County

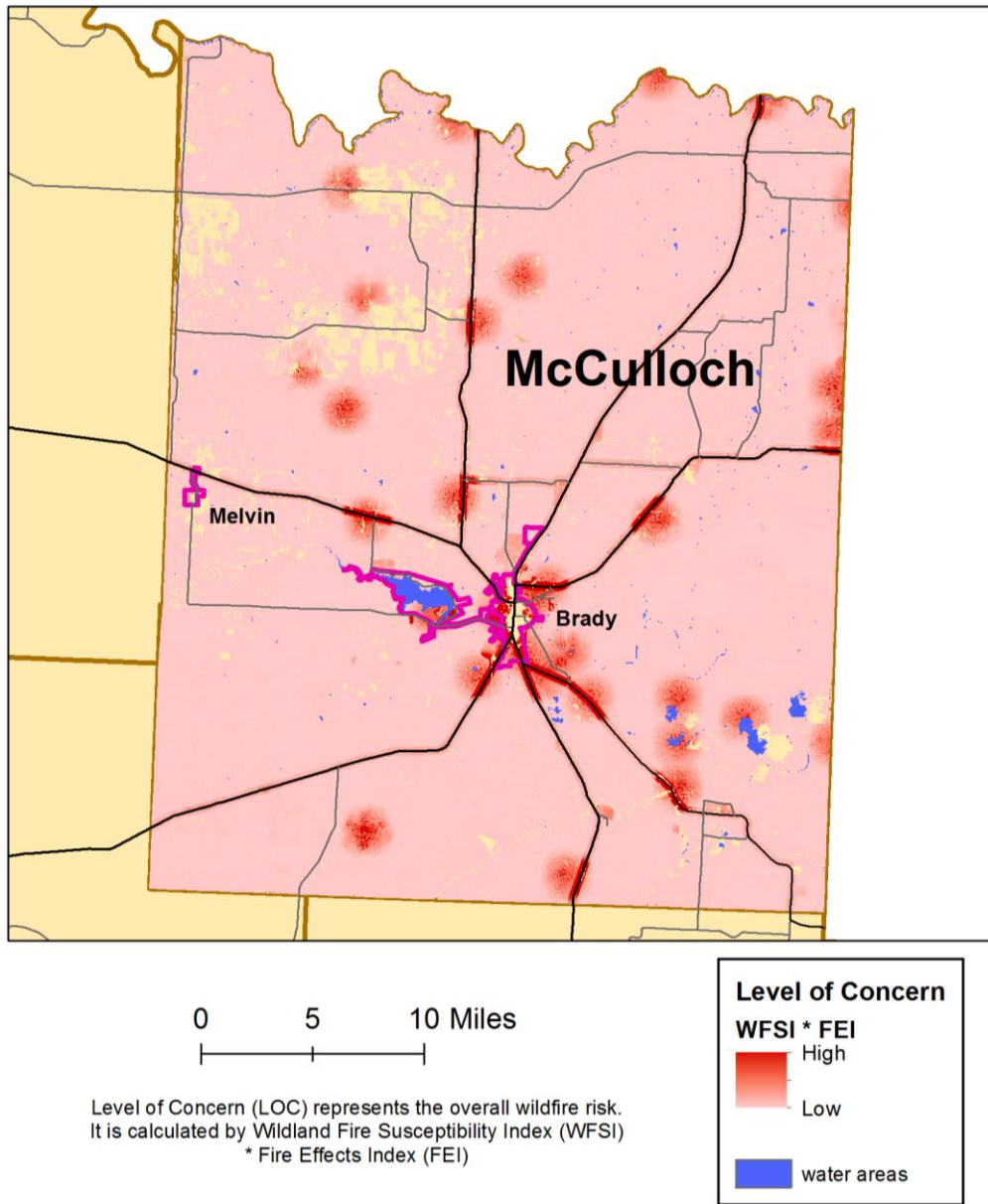


Figure 9-29. Overall Wildfire Risk (Level of Concern): Menard County

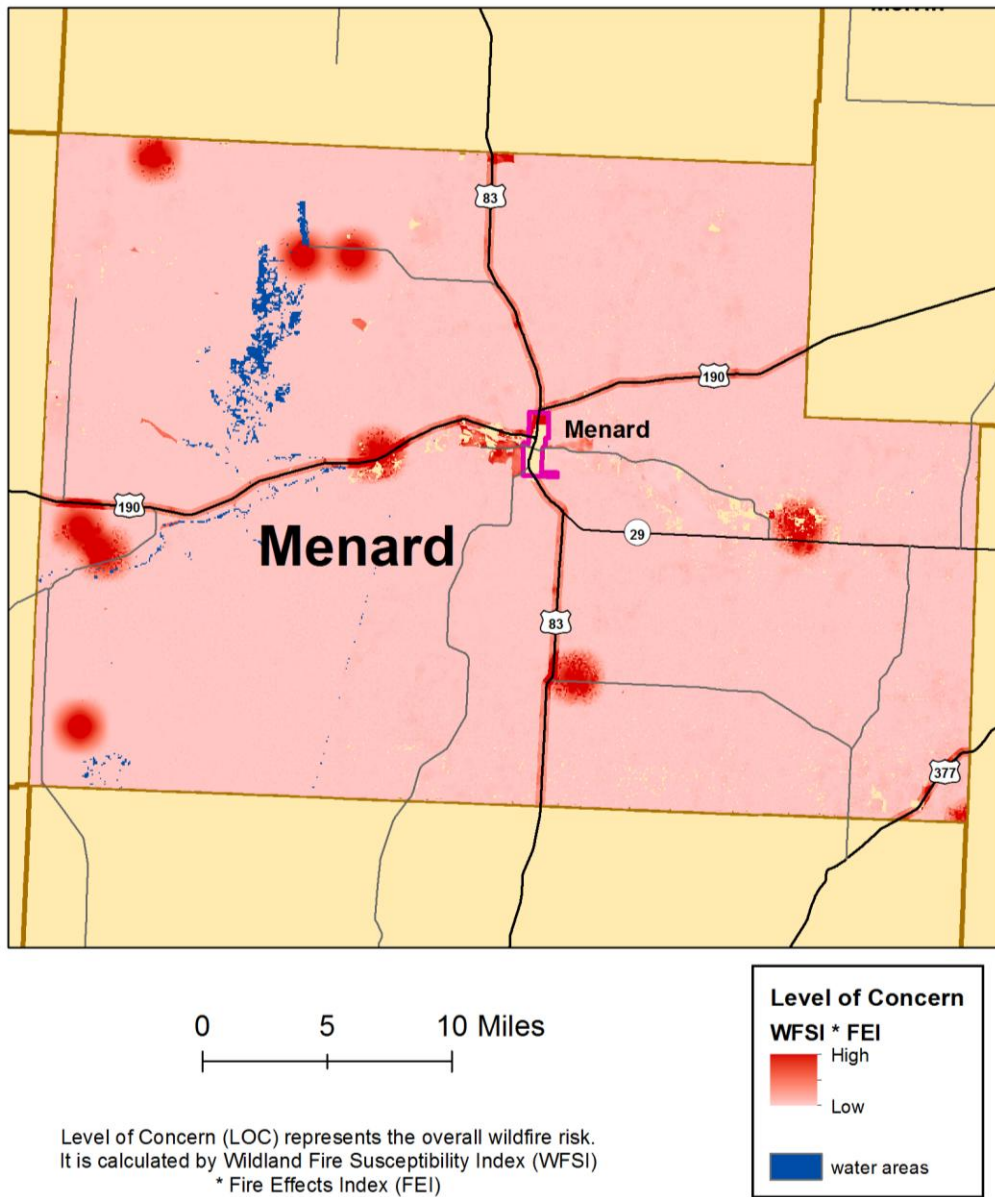
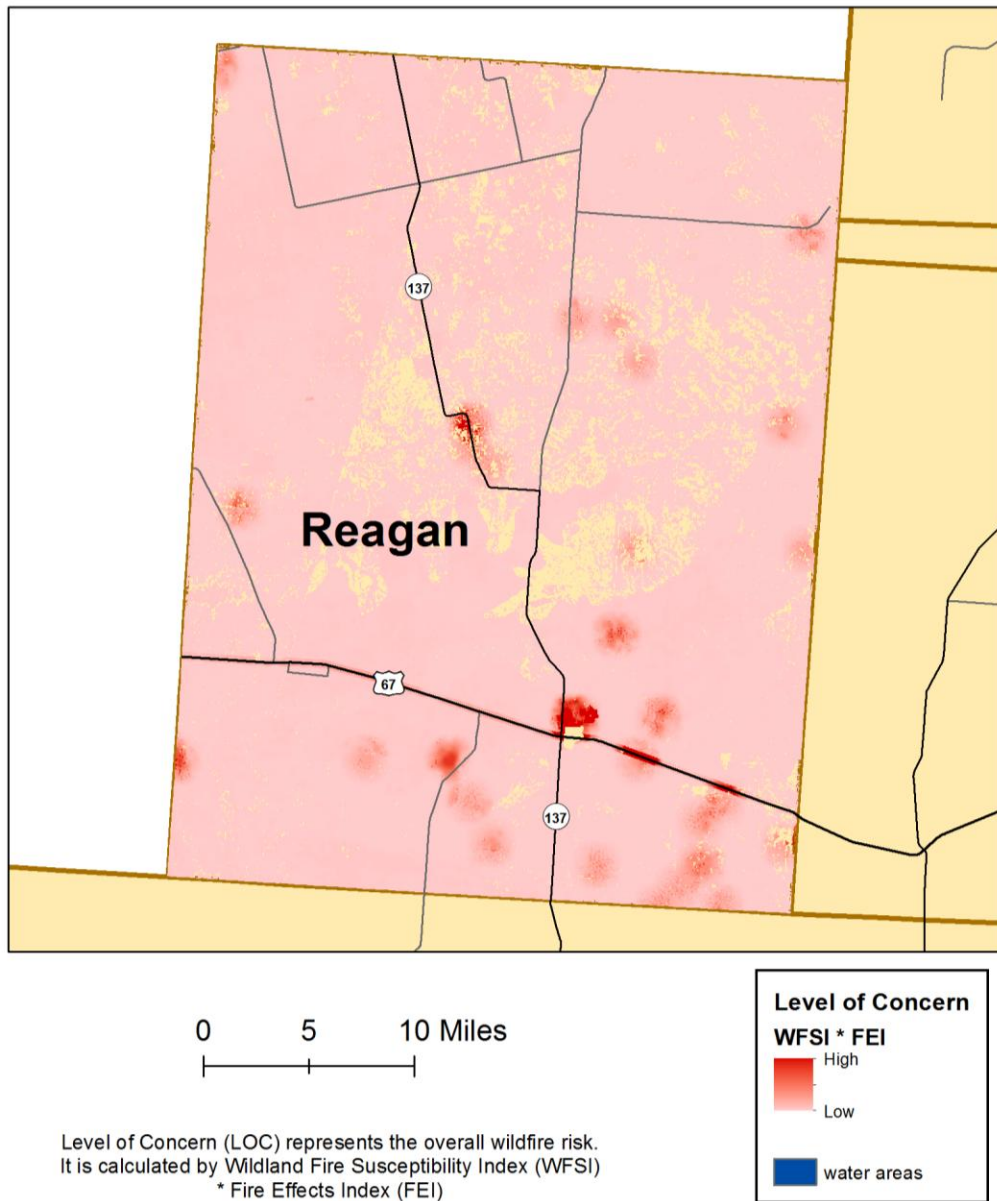


Figure 9-30. Overall Wildfire Risk (Level of Concern): Reagan County



Level of Concern (LOC) represents the overall wildfire risk.
It is calculated by Wildland Fire Susceptibility Index (WFSI)
* Fire Effects Index (FEI)

Figure 9-31. Overall Wildfire Risk (Level of Concern): Schleicher County

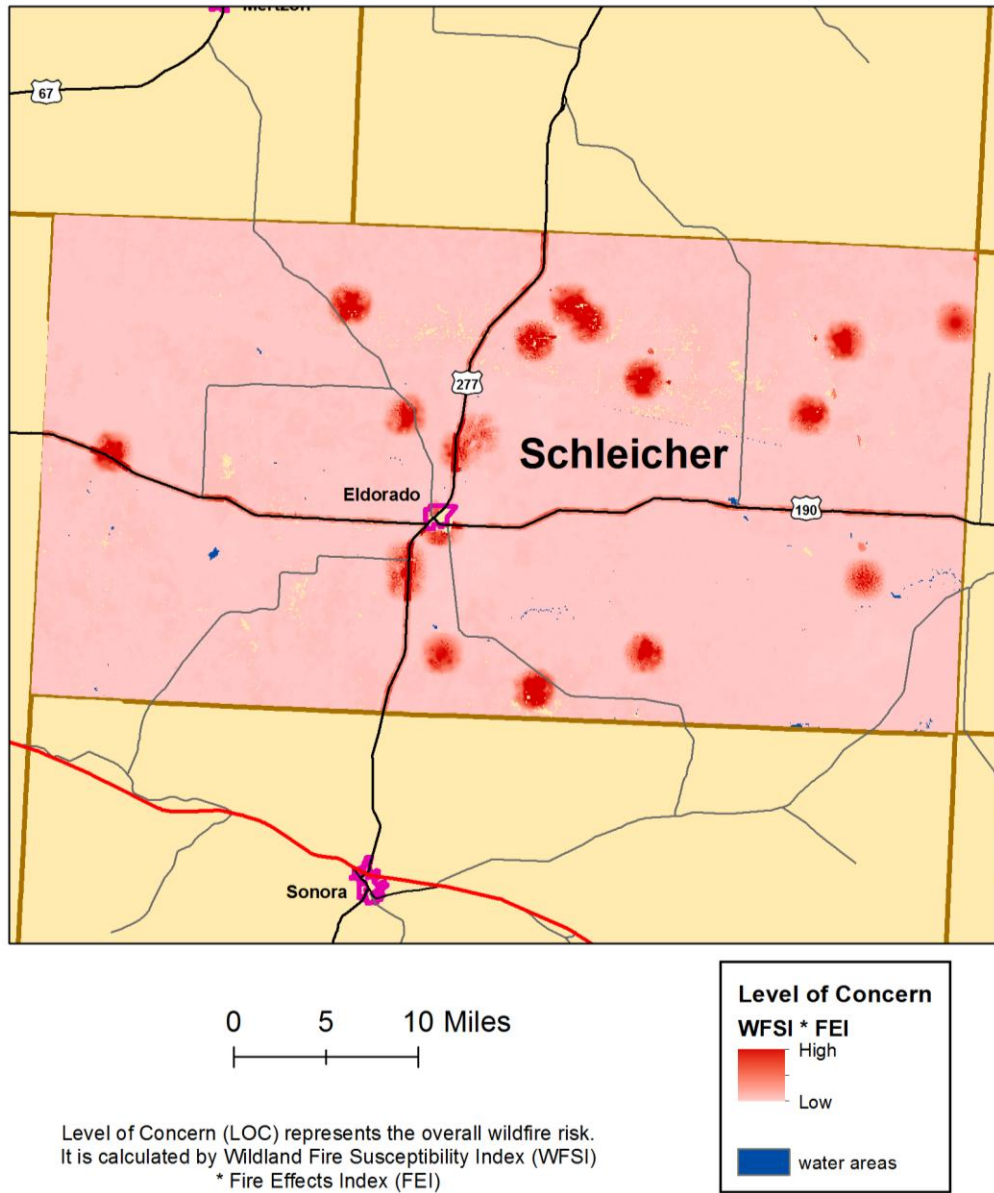


Figure 9-32. Overall Wildfire Risk (Level of Concern): Sterling County

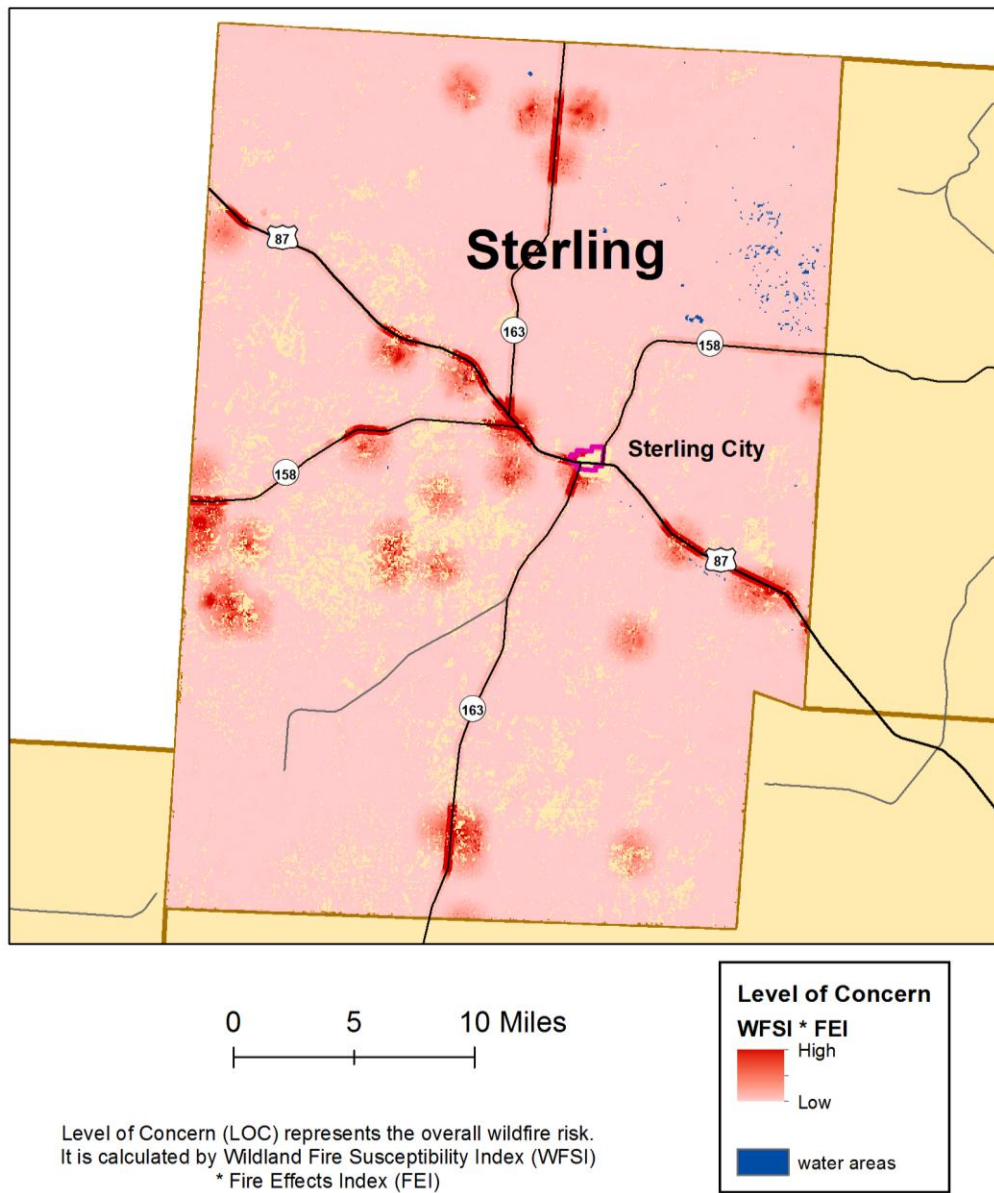


Figure 9-33. Overall Wildfire Risk (Level of Concern): Sutton County

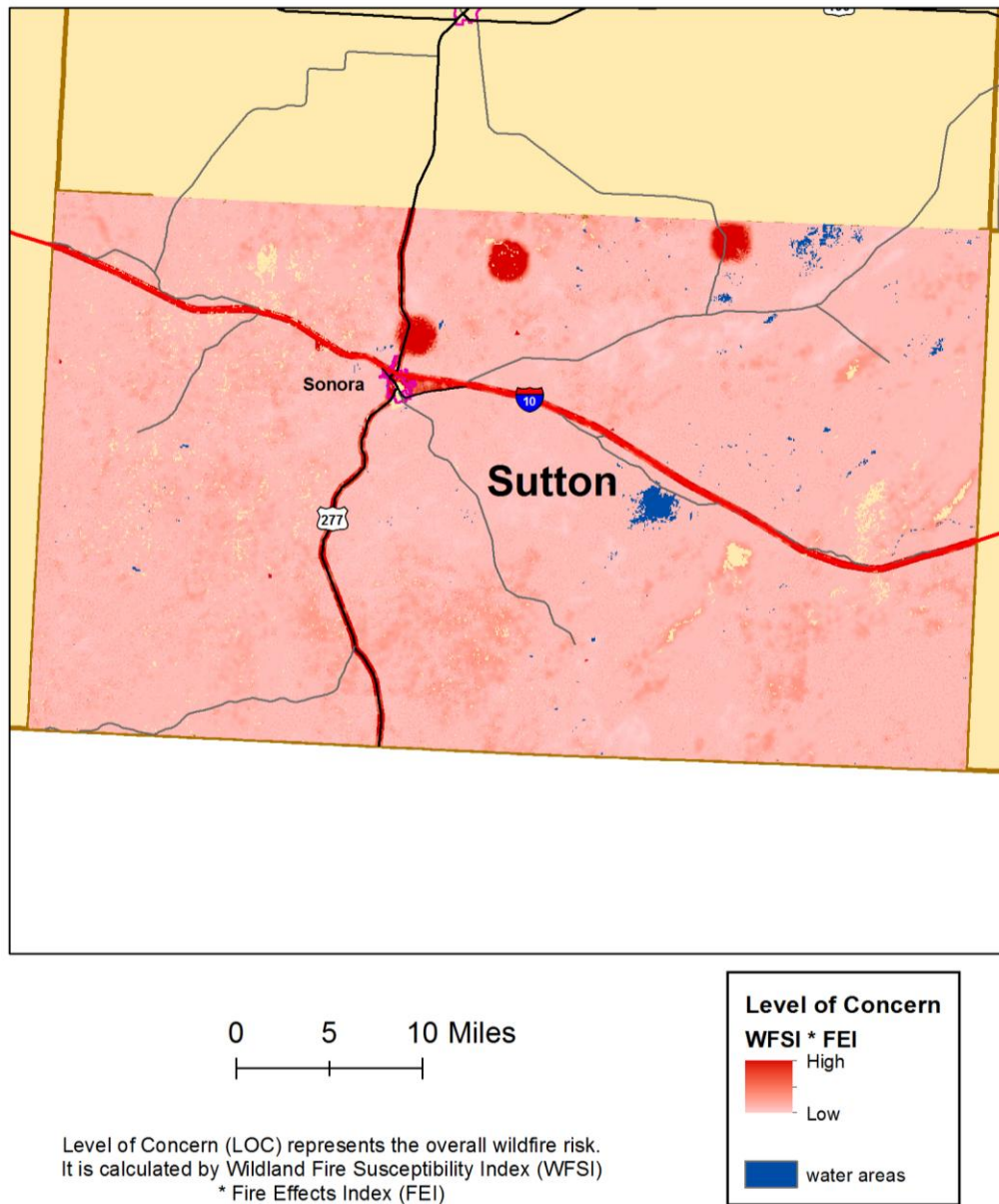


Figure 9-34. Overall Wildfire Risk (Level of Concern): Tom Green County

