

# SECTION 8: WILDFIRE

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## **Hazard Description**

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A wildfire event can rapidly spread out of control and occurs most often in the summer, when the brush is dry and flames can move unchecked through a highly vegetative area. Wildfires can start as a slow burning fire along the forest floor, killing and damaging trees. The fires often spread more rapidly as they reach the tops of trees, with wind carrying the flames from tree to tree. Usually, dense smoke is the first indication of a wildfire.

A wildfire event often begins unnoticed and spreads quickly, lighting brush, trees and homes on fire. For example, a wildfire may be started by a campfire that was not doused properly, tossed cigarette, burning debris, or arson.

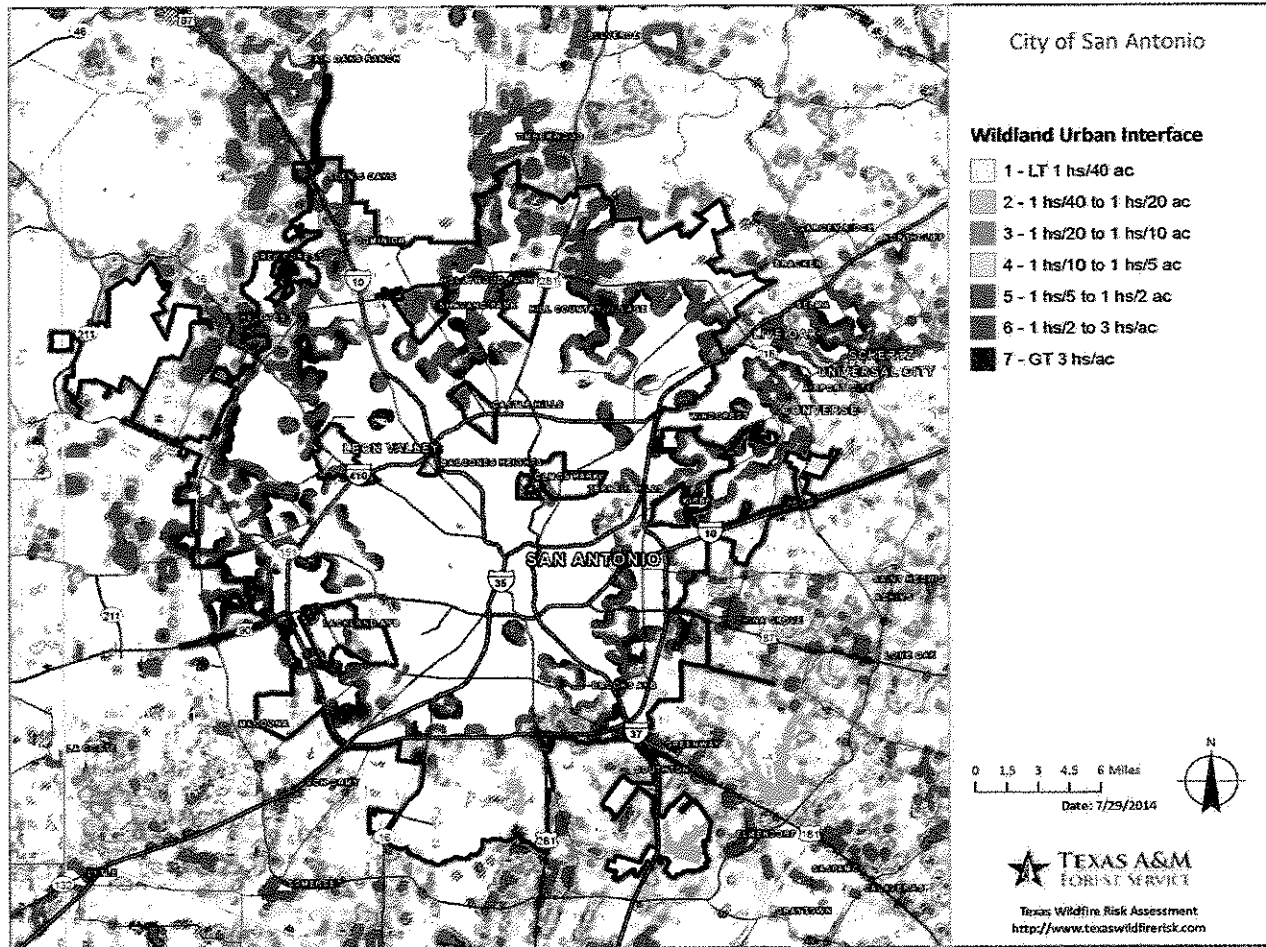
Texas has seen a significant increase in the number of wildfires in the past 30 years, which included wildland, interface, or intermix fires. Wildland Urban Interface or Intermix (WUI) fires occur in areas where structures and other human improvements meet or intermingle with undeveloped wildland or vegetative fuels.

## **Location and Historical Occurrences**

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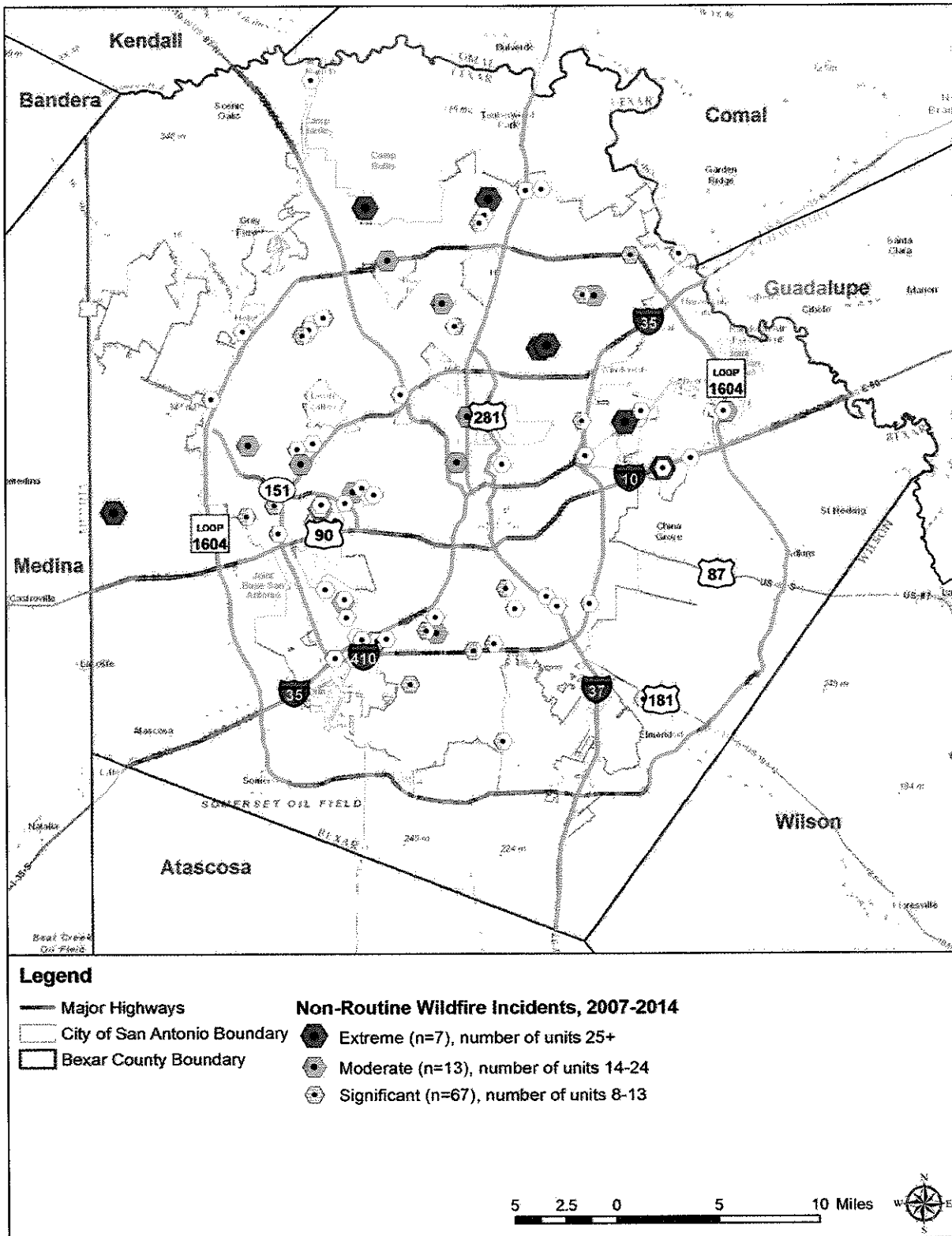
A wildfire event can be a potentially damaging consequence of drought. Wildfires can vary greatly in terms of size, location, intensity and duration. While wildfires are not confined to any specific geographic location, they are most likely to occur in open grasslands. The threat to people and property from a wildfire event is greater in the fringe areas where developed areas meet open grass lands, such as the WUI. (Figure 8-1). It is estimated that 22 percent of the total population in the City of San Antonio live within the WUI. However, the entire City of San Antonio planning area is equally at risk for wildfires.

Figure 8-1. Wildland Urban Interface Map – City of San Antonio



The San Antonio Fire Department reported 83 wildfire events between 2007 and October 2014 and two wildfire events reported by the National Climatic Data Center (NCDC) in 2011 and 2014, which resulted in \$250,000 of property damages. The Texas Forest Service (TFS) started collecting wildfire data in 1985 and volunteer fire departments started reporting events until 2005. Due to a lack of recorded data for wildfire events prior to 2005, frequency calculations are based on a seven-year period, using only data from recorded years. Figure 8-2 illustrates the approximate locations of wildfires according to the San Antonio Fire Department. Tables 8-1 and 8-2 identify the number of wildfires, ignition cause, and acreage of suppressed wildfire by year, according to the TFS.

Figure 8-2. Location and Historic Wildfire Events for San Antonio



**Table 8-1. Number of Wildfires by Cause for San Antonio**

CAUSE	NUMBER
Miscellaneous	51
Debris Burning	17
Equipment Use	6
Children	1
Campfire	1
Smoking	3
Lightning	0
Incendiary	1
<b>TOTAL</b>	<b>81</b>

**Table 8-2. Acreage of Suppressed Wildfire by Year**

JURISDICTION	2005	2006	2007	2008	2009
City of San Antonio	1	82.1	0	115.15	39.88

**Significant Past Events**

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**September 11, 2011 – Wetmore Wildfire**

More than 100 firefighters worked to contain a fast-moving fire, which ignited on September 11, 2011 around 1:00 p.m., behind homes in the 10000 block of Merritme Court, near Wetmore Rd and Broadway. Winds blowing from south to north intensified the flames through the greenbelt until the wind shifted to the east.

The wind caused the fire to spread through a densely-populated residential area. Many residents were seen watering their yards to avoid the spread of fire, and San Antonio police officers drove through neighborhoods with loudspeakers announcing mandatory evacuations. Several structures were damaged and Several hundred people were evacuated from their homes. The San Antonio Area Chapter of the American Red Cross opened a temporary shelter at 10700 Nacogdoches Rd.

A CPS Energy primary line experienced an outage near where the fire originated. According to CPS Energy 3,200 customers were without power.

A number of volunteer fire departments and the Texas Forest Service also responded to the fire, and a helicopter assisted by spraying liquid over the area.

### **September 9, 2011 – Potranco Wildfire**

Firefighters from more than a dozen agencies worked to contain a 250 acre brush fire on September 9, 2011 in west Bexar County. There was no threat to structures during the wildfire event, but the event triggered a series of precautionary evacuations. The fire originate in rugged, hilly terrain near the intersection of Zeta Drive and Potranco Rd at about 1:30 p.m. Texas 211 from U.S. 90 to Potranco Road was closed to traffic until 10 a.m. the following morning.

York Duncan, president of the Texas Research and Technology Foundation, and Jim Dublin, its board chairman, said they rushed to the nearby Texas Research Park and helped evacuate more than 70 apartments, the University of Texas Health Science Center research facilities, and bioscience and technology companies.

As the fire moved west, about 100 residents in the Pioneer Estates neighborhood and along Mechler Road were evacuated to Medina Valley High School. CitiBank also closed its campus, evacuating 2,600 employees. The wildfire then turned to the north, and another 100 residents along Landa Road and in the Potranco Run subdivision were ordered to leave. No injuries were reported.

The Texas Forest Service provided aerial assistance dropping fire retardant on the blaze.

### **September 7, 2011 – Camp Bullis Wildfire**

Flames erupted on Camp Bullis on Thursday September 7, 2011 about 4:15 p.m. in an area where a grass fire had previously ignited Tuesday afternoon. The fire had burned about 150 acres, but no structures were damaged. Aircrafts were dropping retardant on the eastern portion and fire crews were preparing to abate the rest of the blaze overnight. It was predicted to take four days to fully contain the fire.

Residents were evacuated from about 100 homes in Fair Oaks Ranch within a quarter-mile of Wednesday's fire, along Ralph Fair Road, Pimlico Lane and Ruffian Drive. According to the CPS Energy the utility had to reduce power at the Fair Oaks Ranch substation to allow firefighters to continue working, affecting about 4,500 customers.

Although Camp Bullis has its own fire department, firefighters from San Antonio, Bexar County and numerous other agencies assisted.

### **September 5, 2011 – Stone Oak Wildfire**

On September 5, 2011, a wildfire fire started around 1:30 p.m. near Stone Oak Parkway and Evans Road on the north side of San Antonio. There were reportedly several fires burning in the area. Winds at 21 miles per hour, with gusts of up to 35 miles per hour were making it more difficult for firefighters to extinguish the flames.

A San Antonio Water System truck that accidentally caught fire around 1:30 p.m. sparked the Stone Oak wildfire. The fire spread quickly to Stone Oak Parkway and Evans Road,

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prompting mandatory evacuations at The Abbey at Stone Oak Apartments, The Estates at Canyon Ridge Apartments and Champion Village Apartments. Smoke from the fire slowed down traffic on U.S. 281. Parts of Stone Oak Parkway and Canyon Gulf Road were closed. According to the CPS Energy outage map, at least 2,000 people were left without power.

Firefighters from 75 units contained the blaze by 5:00 p.m. and then helicopters arrived to drop water from the sky. The San Antonio Chapter of the American Red Cross set up a temporary shelter at Barbara Bush Middle School for those displaced.

### Extent

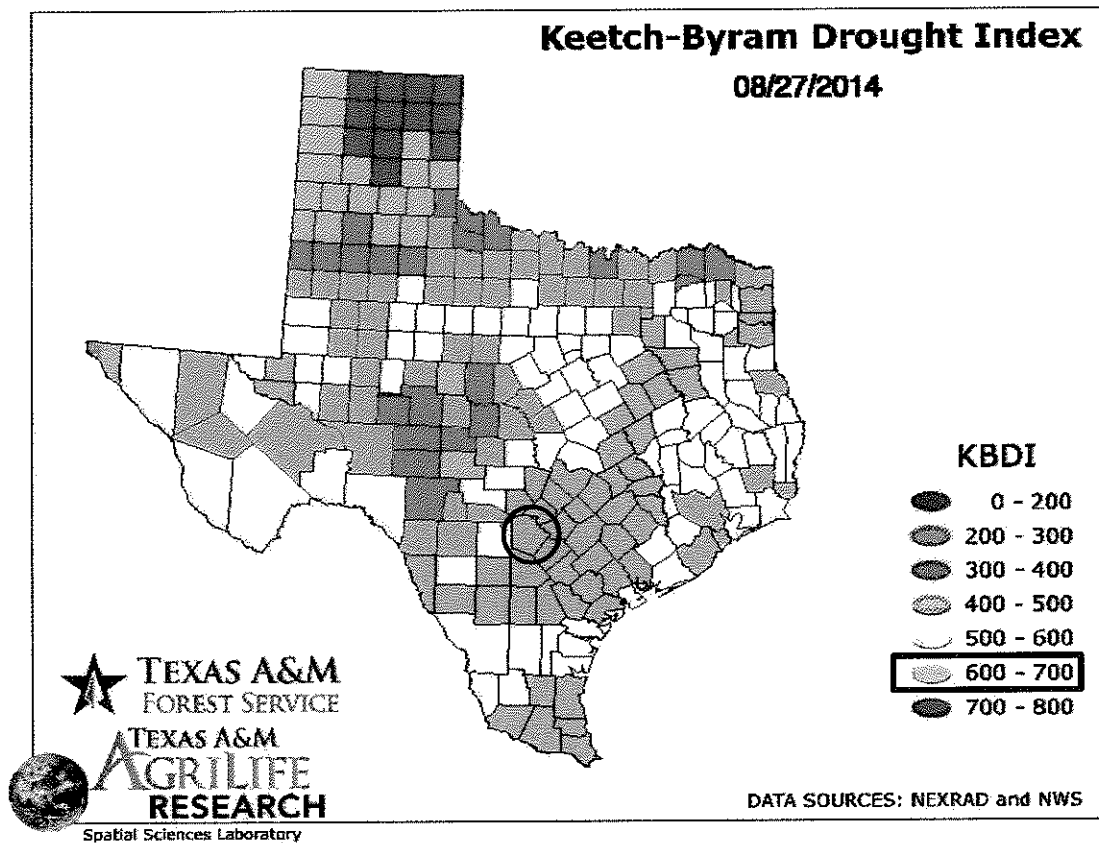
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Risk for a wildfire event is measured in terms of magnitude and intensity using the Keetch Byram Drought Index (KBDI), a mathematical system for relating current and recent weather conditions to potential or expected fire behavior. The KBDI determines forest fire potential based on a daily water balance, derived by balancing a drought factor 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.

Each color in Figure 8-3 represents the drought index at that location. The drought index ranges from 0 to 800. A drought index of 0 represents no moisture depletion, and a drought index of 800 represents absolutely dry conditions.

Figure 8-3. Keetch-Byram Drought Index (KBDI) for the State of Texas, 2014<sup>1</sup>



Fire behavior can be categorized at four distinct levels on the KBDI:

- **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 not readily ignite and burn. Expect smoldering and the resulting smoke to carry into and possibly through the night.
- **400 - 600:** Fires 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 through the night and heavier fuels will actively burn and contribute to fire intensity.

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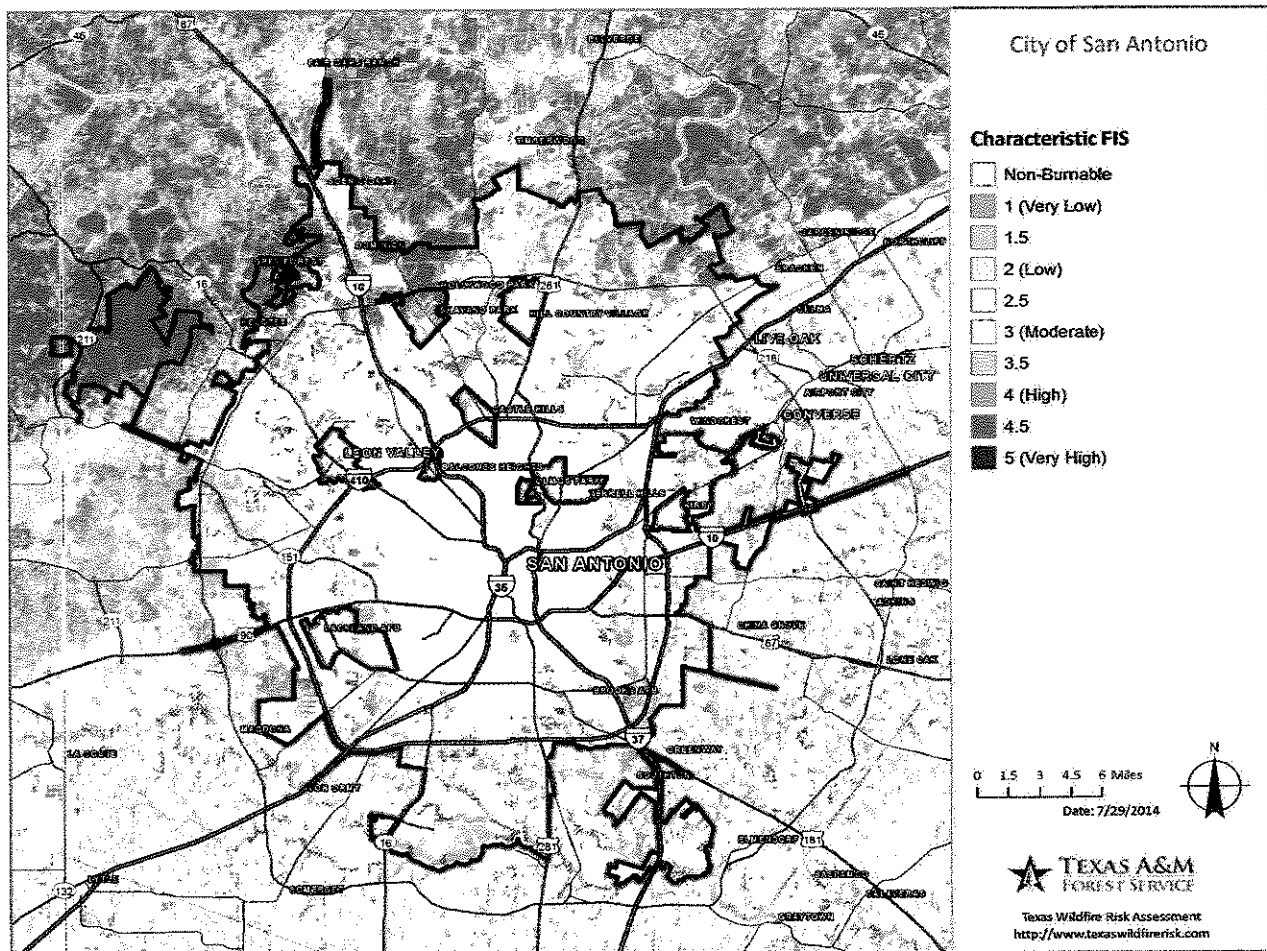
<sup>1</sup> The City of San Antonio is located within the black circle.

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The KBDI is a good measure of the readiness of fuels for a wildfire event. The KBDI should be referenced as the area experiences changes in precipitation and soil moisture, and caution exercised in dryer, hotter conditions.

The range of intensity for the City of San Antonio in a wildfire event is within 600 to 800. The average extent to be mitigated for the City of San Antonio planning area is a KBDI of 605. At 605 KBDI, fires will burn readily, exposing mineral soils. Wildfires will burn through the night and heavier fuels will actively burn and contribute to wildfire intensity. Figure 8-4 identifies the wildfire intensity for the City of San Antonio.

**Figure 8-4. Fire Intensity Scale Map – City of San Antonio**





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### Probability of Future Events

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Wildfires can occur at any time of the year. As the City grows and develops into wild land, the potential area for a wildfire event increases. With 83 events in a seven-year period, an event within the City of San Antonio is highly likely and an event is probable within the next year.

### Vulnerability and Impact

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Periods of drought, dry conditions, high temperatures, and low humidity are factors that contribute to the occurrence of a wildfire event. Areas along railroads and people whose homes are in woodland settings have an increased risk of being affected by wildfire.

The heavily populated, urban areas of the City of San Antonio are not likely to experience large, sweeping fires. Areas outside of the City in the unincorporated areas of Bexar County are vulnerable. Unoccupied buildings and open spaces that have not been maintained have the greatest vulnerability to wildfire. The overall level of concern for wildfires is located mostly along the perimeter of the WUI.

Within the City of San Antonio, a total of 83 fire events were reported from 2007 to 2014. All of these events were suspected wildfires. Historic loss and annualized loss estimates due to wildfires are presented in Table 8-3. The frequency is approximately nine events every year. Figure 8-5 illustrates the likelihood of a wildfire event in the City of San Antonio.

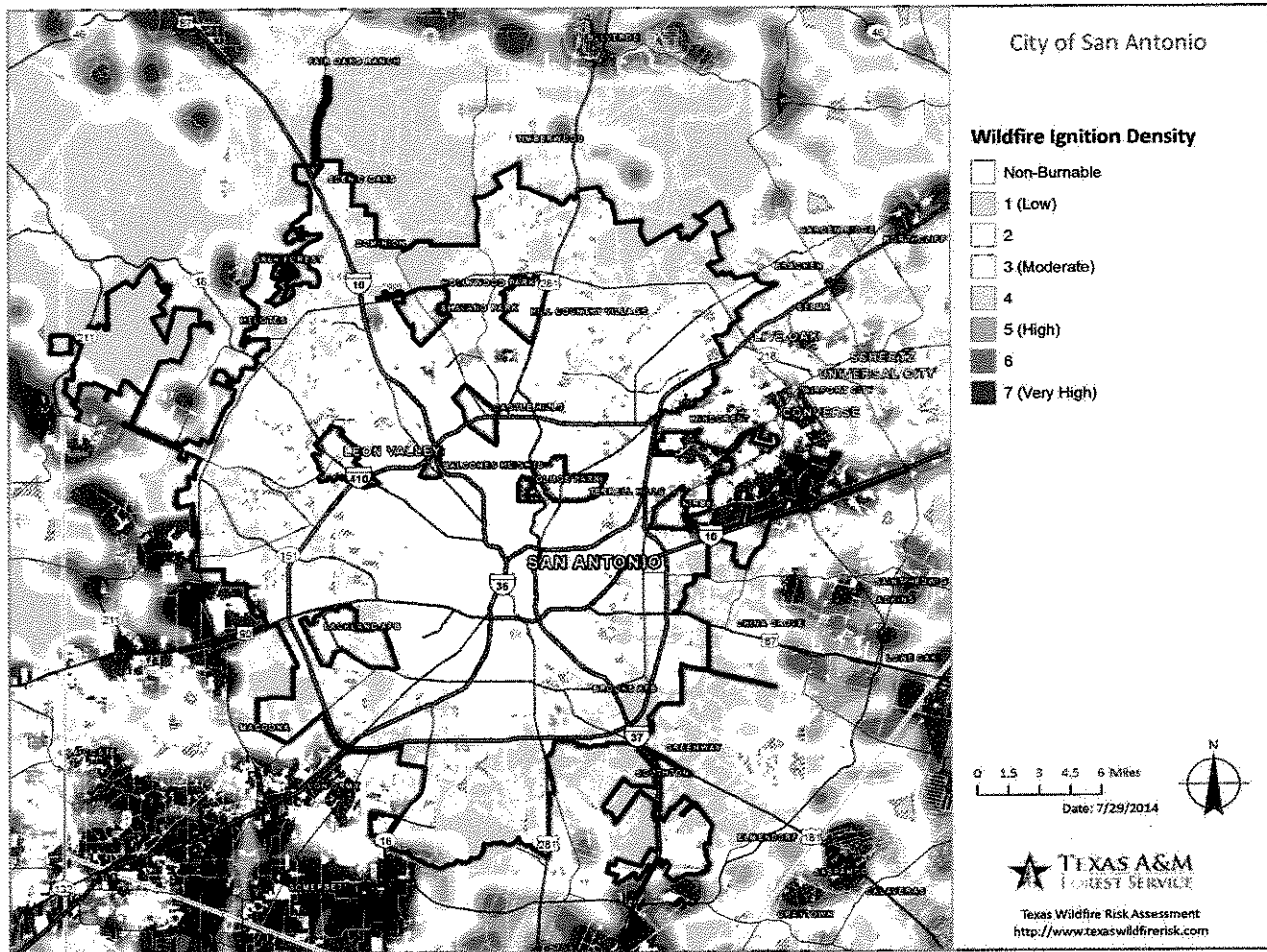
**Table 8-3. Historic Loss Estimates Due to Wildfire<sup>2</sup>**

JURISDICTION	NUMBER OF EVENTS	ACRES BURNED	INJURIES	DEATHS	ANNUAL LOSSES	ANNUAL ACRE LOSSES
City of San Antonio	83	238.13	0	0	\$27,778	26.46

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<sup>2</sup> Events divided by 7 years of data.

Figure 8-5. Likelihood of Wildfire Starting – City of San Antonio



Diminished air quality is an environmental impact that can result from a wildfire event and pose a potential health risk. The smoke plumes from wildfires can contain potentially inhalable carcinogenic matter. Fine particles of invisible soot and ash that are too microscopic for the respiratory system to filter can cause immediate and possibly long term health effects. The elderly or those individuals with compromised respiratory systems may be more vulnerable to the effects of diminished air quality after a wildfire event.

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 wildfires. The intensity and rate at which wildfires spread are directly related to wind speed, temperature, and relative humidity.

The severity of impact from major wildfire events can be substantial. Such events can cause multiple deaths, shut down facilities for 30 days or more, and cause more than 50 percent of affected properties to be destroyed or suffer major damage. Severity of impact is gauged by acreage burned, homes and structures lost, and the number of

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resulting injuries and fatalities. For the City of San Antonio planning area, the impact from a wildfire event can be considered “Minor,” and injuries are possible but may not result in permanent disability, complete shutdown of critical City area facilities for more than one week, and more than ten percent of property destroyed or with major damage.

### Assessment of Impacts

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A Wildfire event poses a potentially significant risk to public health and safety, particularly if the wildfire is initially unnoticed and spreads quickly. Persons in the area at the time of the fire are at risk for injury or death from the variety of threats present during a wildfire event. Burns to the human body and smoke inhalation are the foremost threats.

Response personnel face the same potential impacts as the general public. Response personnel can also be at increased risk of physical injury because the nature of their responsibilities may bring them closer to the hazard. Response personnel can experience more long-term impacts resulting from prolonged exposure to smoke, chemicals, and heat. Heart disease, respiratory problems, and related illnesses can develop in response personnel after repeated and concentrated exposure.

Depending on the characteristics and location of the wildfire event, it is possible that operations and service delivery could be impacted by a wildfire. While the San Antonio Office of Emergency Management (SAOEM) has a protected facility from which to operate, the facility may not be accessible in the event of a fire near the facility. If the SAOEM office was inaccessible, then staff members would be limited to performing work with the resources that were accessible to them from their remote location.

Other City departments may not be as protected as the SAOEM and may suffer more interruptions as a result of damages from a wildfire. If hard or electronic files are damaged, destroyed or otherwise inaccessible, a department may be unable to perform its assigned tasks and deliver its designated services. This interruption could have significant impacts throughout the City and could negatively impact its ability to respond to and recover from the wildfire event. Without a Continuity of Operations Plan (COOP) that takes into account department-specific issues, or regular exercise of that COOP, critical departments may not be able to function and provide necessary services.

Damage from a wildfire even can have an impact on utility infrastructure. This could result in a temporary loss of function for businesses in the planning area that rely on utilities for operation, even if those businesses were not directly impacted by the fire. Additionally, businesses can suffer interruption from closed or blocked roadways. For example, firefighters may need to close a roadway in the event that a wildfire grows out of control or shifts unexpectedly. This could negatively impact other businesses in the area that were not otherwise damaged.

Most property, facilities, and infrastructure within the planning area are at risk from damage or destruction from a wildfire event, including residential and commercial

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structures and their supporting utilities, vehicles and transportation infrastructure, and community buildings, such as hospitals, police stations, and schools. Table 8-4 identifies critical facilities according to their location within the WUI. These facilities were mapped in relation to the High Density Intermix Area and High Density Interface Zones.

**Table 8-4. Critical Facilities Located within the Wildland Urban Interface**

DHS INFRASTRUCTURE SECTOR	NUMBER OF FACILITIES
Agriculture and Food	6
Banking and Finance	26
Chemical and Hazardous Materials Industry	21
Defense Industrial Base	N/A
Energy	1
Emergency Services	20
Information Technology	N/A
Communications	-
Postal and Shipping	4
Healthcare and Public Health	138
Transportation	1
Water	11
National Monuments and Icons	-
Commercial Facilities	251
Government Facilities	34
Dams	-
Nuclear Reactors, Materials, and Waste	1
Manufacturing	-

Roadways in or near the WUI could also be impacted by wildfire because of damage or closure resulting from smoke and limited visibility.

Wildfires are often a natural phenomenon and part of the normal cycle of the natural environment. Wildfires can result in significant deforestation, wildlife death, and cause water and air pollution. Environmental damage caused by a wildfire event may take decades, or longer, to become fully restored.

Wildfire also performs a variety of environmentally beneficial functions to the burned area. Fire returns nutrients to the soils, encourages growth of more fire-resistant fauna and trees, and promotes the establishment of seedlings. Many wildlife species thrive in the aftermath of wildfire. The grasses, seedling shrub, and trees that reestablish in a burned area provide an ideal environment for many small seed-eating mammals and

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birds, such as voles and sparrows. The abundance of small prey attracts predators like foxes, hawks, and weasels. Burned trees provide sites for cavity-nesting birds like flickers, kestrels, and chickadees, and woodpeckers thrive on the insects that inhabit fire-killed trees. (Source: *Property and Environment Research Center*)

The San Antonio planning area is home to a large number of cultural and historic resources. Many of the historic neighborhoods may be at risk from a wildfire event because they are of a construction type and material that is more vulnerable to fire. Historic homes are generally exempt from modern building code requirements, which may require fire suppression equipment in the structure, and are often constructed close together. In addition, the City's historic and cultural resources are a significant draw for tourists and visitors to the area and help to generate revenue through taxes and fees. This revenue in turn pays services and programs, which benefit residents and the community.

The financial and economic impacts associated with a wildfire event may be significant. A major fire, where a large number of structures are damaged or destroyed, can have serious economic and financial consequences for a community. These consequences will depend on what is damaged, the extent of the damage, and the services the damaged structures provided to the community.

The economic and financial impacts of a wildfire event on local government will depend on the scale of the event, what is damaged, costs of repair or replacement, lost business days in impacted areas, and how quickly repairs to critical components of the economy can be implemented. The level of preparedness and pre-event planning done by businesses and citizens will also contribute to the overall economic and financial conditions in the aftermath of a wildfire event.

Public confidence in local government may be impacted by how response and recovery efforts resulting from the event are handled. A response demonstrating that the City, its leaders, and officials were prepared for the event, anticipated the magnitude, and understood what could happen, will boost the City's reputation and standing with residents. However, if the perception develops, correctly or incorrectly, that the response was slow, needs or complaints of its residents were ignored, or failure to anticipate the magnitude of the event, then public confidence may decline.

A wildfire that is responded to and handled with little damage to structures or infrastructure can enhance public perception. Visual images of the firefighting and suppression effort can be a powerful tool to aid in the public trust and confidence regarding firefighting and public safety.