

Texas Wildland Fuels

Fuel Model guide



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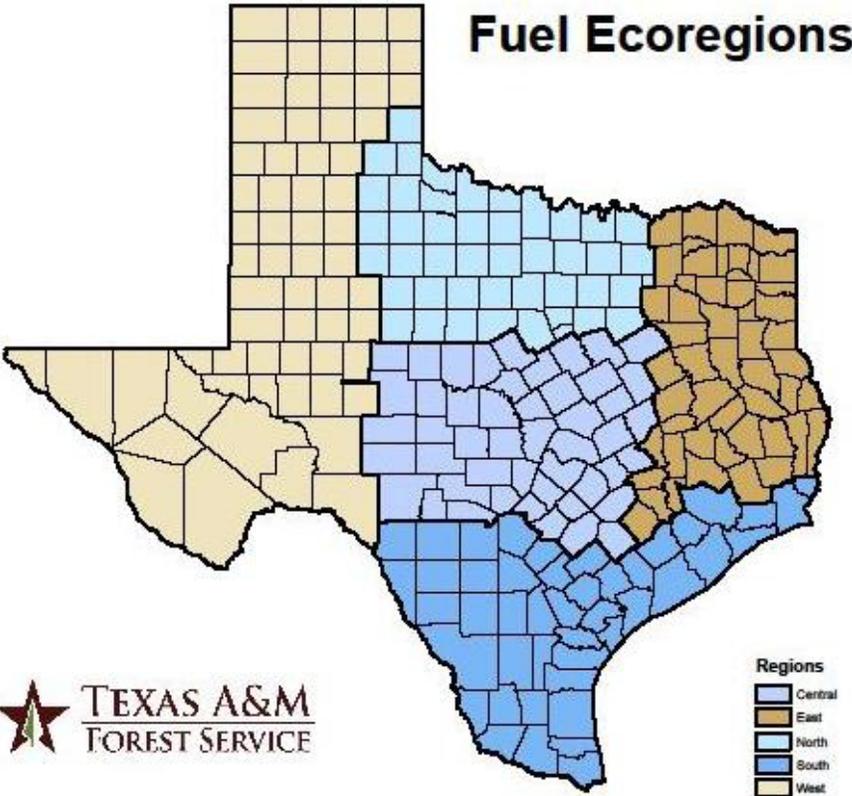
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Information compiled by Texas A&M Forest Service Fire Analyst Brad Smith

Introduction

The state of Texas covers a large geographic area that is diverse in climate, vegetation and ownership. The combination of these three factors determines the wildland fuel type present on the land. A fuel type can be described as an association or community of vegetative species with distinctive size, arrangement or other characteristics that produce predictable fire behavior or similar resistance to control when subjected to specified weather conditions.

If you consider the size and diversity of the vegetative communities of Texas and throw in the land use objectives of the private landowners who own almost 96 percent of the land in Texas, the combinations could lead to identifying hundreds — if not thousands — of different fuel types across the state.

This guide to the regional wildland fuel types of Texas is intended as a broad introduction to the major wildland fuel types in five general regions of the state. Below are the five fuel ecoregions as defined for this guide.



This guide

- Focuses on the four general fuel type groupings: Timber, Brush, Grass, Slash
- Looks at combinations of these fuel type groupings: Grass and Brush; Timber and Brush
- Highlights fuel types for each region that can be considered high risk fuels. The designation of high risk is applied to fuels that have historically produced high impact or significant fires.

When these high risk fuels reach a certain level of dryness and are exposed to critical or extreme fire weather, they are capable of producing fast moving, high intensity wildland fires that can threaten public safety and property.
- Uses terms that are known by wildland firefighters but are not often used outside of the wildland firefighting community. The full Glossary of Wildland Fire Terminology is available at <http://www.nwccg.gov/glossary-of-wildland-fire-terminology>.

Other Fuel Guides

There are a number of fuel model guides available that further divide the major fuel groups into more specific fuel types or fuel models. These guides may provide increased awareness of the scope of fuel models/fuel types that others have defined within the major fuel type groups that are highlighted in this guide.

- Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model http://www.fs.fed.us/rm/pubs/rmrs_gtr153.pdf
- Aids to Determining Fuel Models For Estimating Fire Behavior http://www.fs.fed.us/rm/pubs_int/int_gtr122.pdf
- The Vegetation Types Of Texas Including Cropland https://tpwd.texas.gov/publications/pwd-pubs/media/pwd_bn_w7000_0120.pdf

East Texas Overview

The climate and soils of East Texas support a wide variety of plant communities. Annual rainfall ranging from 40–50 inches, a 7–8 month growing season and deep loamy soils support a commercial timber industry, livestock production, farming and recreational opportunities in the wildland areas of East Texas. This diversity in land use objectives along with subtle changes in climate and soils from east to west and north to south in the East Texas region create a complex fuelscape that is constantly changing.

High Risk Fuels

The common denominator for high risk fuel beds in East Texas is the pine species. Generally it will be loblolly pine as it is the most common native species and it is favored for commercial forest production. There are two situations or configurations of pine fuel beds that should be considered as high risk fuel beds. A closed canopy pine plantation and managed pine with a heavy rough that includes yaupon brush should be considered high risk fuels. Both configurations should be considered high risk as they produce high fire intensity and have a high potential to support crown fire when fuel dryness and fire weather thresholds are met.



The above photo shows a managed pine plantation that has been thinned out within the last five years. Yaupon brush can be seen growing in the “take out row” from the thinning. When the pine canopy is opened up from a thinning, the brush or rough underneath the pine canopy responds to the added sunlight that now reaches the surface. Yaupon brush has a chemical content that promotes active burning. The rough brush and especially yaupon will act as a ladder fuel and help to transition a surface fire to a crown fire. Even if the dominant pine canopy does not support active or running crown fire it can support passive crown fire or torching. Single tree or group tree torching provides an elevated platform for spotting. The rough brush below the dominant canopy can support active running crown fire that will produce extreme fire intensities.



Most closed canopy pine plantations are generally 8 to 15 years old and have not yet been thinned. The canopies have grown together and closed out the sunlight from reaching the surface. The surface fuel is predominantly needle litter. This configuration of pine also has a high potential to support active or running crown fire when fuel dryness and fire weather thresholds are met. The bases of the crowns are very low to the surface. It does not take much surface fire intensity to transition a surface fire into the pine crowns.



A combination of a closed canopy pine plantation that also includes an understory rough with yaupon brush has the highest potential for crown fire of any fuel type found in East Texas.

The image to the right is the same closed canopy pine plantation as seen above after an active crown fire occurred. This fire quickly transitioned from the surface and actively spread through the pine canopies. Critical fuel dryness and fire weather thresholds were present during the active crown fire.



Timber Litter

Timber litter refers to debris on the forest surface that was shed or dropped from the trees of the collective forest. This debris or timber litter can include pine needles, hardwood leaves and branchwood. Timber litter can be described by the depth of the litter layer, the composition (needles or leaves), whether the litter is loose or compacted, and the amount of dead branchwood on the ground.

Surface fire intensities increase as the amount of timber litter increases. Deep litter layers that contain a high percentage of dead branchwood will burn more intensely due to the higher fuel loading. Long needle or large leaf litter that is uniform across the surface and not compacted will produce higher rates of spread than compacted short needle or small leaf litter.



The hardwood leaf litter pictured at left is typically seen during the fall and winter seasons after leaf fall. The large dead hardwood leaves provide a loose, shallow litter layer that supports surface spread and moderate fire intensities.



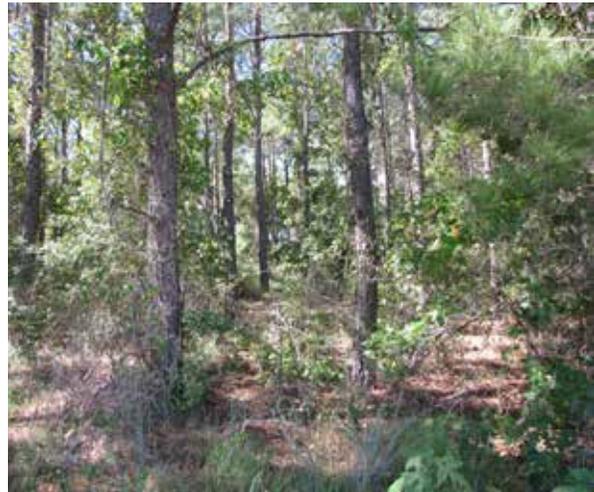
Pictured to the left is an example of timber litter composed of pine needles. Needle litter layers are generally deeper than leaf litter and carry a higher loading or weight per unit area (lbs./sq. ft.). The higher loading translates into higher surface fire intensity as fires will burn hotter as available fuel increases.

Brush

Fuels that are included in the brush category can be found growing in different circumstances and different vegetative communities. This variability creates some grey area between the brush/timber litter and brush/grass fuel types. Three common brush fuel types are found in East Texas: 1. The understory brush or rough found growing underneath a timber overstory; 2. A young stand of pine regeneration; and, 3. Vegetation found growing 2 to 6 years following a timber harvest.



Heavy Rough



Moderate Rough

Above are examples of understory brush growing beneath a timber overstory. You may recognize the left picture as an example of a high risk fuel type from an earlier discussion. The grey area between timber and brush can be illustrated with these two examples. At some point there is not enough understory brush present to call it a brush fuel type and it transitions to a timber litter fuel type. The presence of yaupon brush would weigh in favor of a brush fuel type. If it is subjectively determined that the timber litter is the main carrier of fire spread then it is a timber litter fuel type.



The image to the left shows an area that has been recently harvested, most likely within the last 18 months. The tops of the harvested trees still retain their structure and the dead leaves are still attached. New brush growth from sprouting is also occurring. Surface fire spread in these cutover fuels is slow in the compacted dead litter fuel. Fire intensities are high when dead piles burn and there is a risk of short range spotting from the burning piles. The brush component does not contribute much to fire spread or intensity at this early stage of growth.

Grasses

Grass fuels are not a dominant fuel type in East Texas but they do play an important role. Grass fuels, when cured, act as a bridge between areas of timber fuels. They also provide a receptive fuel bed for ignitions. Many wildfires start in grass fuels along roads or near homes and then spread into timber or brush fuels.



Improved grasses in pastures act as a bridge for a fire to reach other timber or brush fuel types.

Grasses can also mix in with shrub and brush fuels. The result is increased continuity in the fuel bed which allows for more efficient spread of fire. Two common examples are grass and herbaceous fuels returning and mixing in with brush after a timber harvest. It may take two growing seasons before the grass component in this type of brush has enough continuity to carry fire spread.

Another common example of grass mixing in with a shrub is a young pine plantation. The example here depicts three- to four-year-old pine trees that were planted or may have voluntarily seeded into a grass field. The grass component allows high rates of spread under windy conditions and the pine shrub component increases fire intensity.



North Texas Overview

North Texas, as defined for this guide, is made up of three general ecoregions. These include the Blackland Prairies, the Cross Timbers, and the Rolling Plains. A sharp average annual rainfall gradient from 35 inches in the east to 20 inches in the west help to define the varied vegetative communities found in North Texas.

Some of the highest population densities in the state can be found near the Dallas/Fort Worth metropolis and surrounding counties in the Blackland Prairies of North Central Texas. Increasing development and modest ownership sizes have a direct impact on the type and expanse of vegetation across the landscape. The smaller ownerships combined with a varied land use creates a patchwork of vegetative communities or fuel types across the landscape. Population densities decrease as you move west across North Texas into the Cross Timbers and eventually into the Rolling Plains. Larger expanses of similar fuel types trend with the decrease in population densities.

High Risk Fuels

A combination of grass and brush, where the brush component is predominantly juniper, is the fuel type that has consistently produced high impact wildfires over recent years. Ashe juniper and red berry juniper are the evergreen species most commonly found in North Texas. The canopies of this juniper brush will readily burn after extended dry periods. The juniper canopies extend almost to the ground and are easily ignited by a surface fire burning in grass fuels. The amount and distribution of grass and brush will determine how fast a wildfire will spread or how intense it will burn. Increasing the proportion of grass will increase the rate of spread. An increase in the brush component will generally slow

the rate of spread but increase the fire intensities.



This picture of a high intensity crown fire in Ashe juniper was taken on April 15, 2011 on the PK Complex fire in Palo Pinto County. This high risk grass and brush fuel type was heavily weighted with the brush component. A combination of extended drying and extreme fire weather associated with a frontal passage this day produced the high impact wildfire pictured here.



This picture of a grass and brush community was taken in Motley County on the western extent of North Texas. The grass component here is dominant. As the grass component increases, the potential rate of fire spread increases. Wildland fires burning in this fuel type have produced rates of spread up to 6 mph when extreme fire weather is present.

Both examples of grass and brush fuels shown here can be considered high risk fuels in North Texas. The high inten-

sity fires produced by dominant juniper brush and the extreme rates of spread produced in dominant grass fuels are both very resistant to suppression efforts when high impact fire weather is present.

Timber Litter

The Cross Timbers region of North Texas, just to the west of the Dallas/Fort Worth metroplex, supports a variety of hardwood and oak timber species. The timber community that has historically produced larger wildland fires that are more resistant to control is the post oak Timber Community.



Post oak communities are often found on rocky slopes in rough, broken terrain. The post oak is a medium size tree that produces a large leaf. The leaf litter beneath a stand of post oak is deep and loosely packed for a hardwood. The deep and loosely packed litter provides a continuous and receptive fuel bed for surface fire spread.



Timber stands in the Cross Timbers region can also be found in the deeper soils of the prairies. These stands are of moderate size and are situated among the grassland prairies. The mix of grass and timber fuels will add complexity to wildland fires occurring here. The timber fuels add intensity and are difficult to access while the grass provides a speedy pathway between the stands of timber.

Grasses

The argument could be made that the grass fuel component in North Texas determines the amount of fire activity in the region at any given time. Cured grasses provide a receptive fuel bed for fire ignitions and fire spread. Freeze cured grasses are present from late fall through early spring. Drought cured grasses are often present during the late summer drying season. The amount of grass and the distribution or continuity of grass across the surface is also an important factor. Above normal amounts or loading of grass fuels will generally occur when above normal rainfall occurs during the May through September growing season. The stage was set for the historic 2011 Texas fire season during the summer of 2010 when four tropical storm systems provided 200–300 percent of normal rainfall across the grass dominant Plains of Texas. This growing season rainfall produced a record crop of grass that facilitated the growth and spread of wildfires during the winter of 2011 when the record crop of grasses were freeze cured.



Pictured here are above normal amounts of cured grasses in a grass and brush fuel type. This thick, continuous arrangement of grass fuel increases the resistance to control of any wildfire burning here.



The picture to the left, from late March of 2012, shows below normal grass amounts transitioning from a cured state to green. Wildland fire will struggle to spread through grasses in this condition; just the opposite effect that above normal grass loading has on fire spread.

2012 was the second year of persistent drought. The red needles in the juniper are indicators of drought stress. There was little to no grass production during the

2011 growing season. Below normal grass amounts led to a below normal 2012 winter fire season.

West Texas Overview

Our depiction of the West Texas Fuel Ecoregion stretches from the generally level terrain of the High Plains to the rugged mountains of the Trans Pecos down to the Chihuahuan Desert along the Mexican border. Grasses are the dominant fuel covering the West Texas landscape but they can be found mixed with different brush species throughout the region. The West Texas mountains support a varied vegetative community due to contrasts in elevation and rainfall.

Lower elevations are dominated by grasses but as elevation increases brush communities appear and eventually the brush will transition to timber communities in the mountain ranges with the higher elevations. Crop and livestock production have a significant influence on the grass dominant fuelscape of West Texas. Brush control and grazing practices influence the amount of grass that is present on the range.

There is a well-defined fire season for West Texas due to a well-defined rainfall pattern for West Texas. The rainfall pattern is similar to the monsoonal pattern of the southwestern United States. The 15–25 inches of annual rainfall is mostly observed from June through September. This seasonal rainfall will green the grass dominant fuelscape and greatly reduce the wildland fire potential. The peak season for fire activity is mid-February through mid-May which coincides with peak frontal passage activity.

The amount of grass or what we call fine fuel loading (measured in tons/acre) will influence the type and severity of fires that occur in a grass dominant landscape. Wildland fires spread faster, burn more intensely and are more resistant to control when there is more grass or higher fine fuel loadings present.

The relationship between fine fuel loading and fire occurrence can be shown by contrasting the 2011 and 2012 fire activity in the High Plains. 2011 was the first year of a three year drought in Texas but was preceded by a very wet growing season during the summer of 2010. The wet growing season

produced an above average crop of grass that was present for the 2011 fire season. 2012 was the second year of persistent drought in the High Plains. There was very little if any grass production during the growing season of 2011. The result was a below normal amount of grass on the landscape for the 2012 fire season. Both years saw active fire weather during the respective fire seasons. The glaring difference between the two fire seasons was the amount of grass on the landscape.

Contrasting Fire Seasons on the High Plains

Year	Number of Fires	Number of Acres
2011 above normal grass	106	241,901
2012 below normal grass	5	1,266

Fire statistics provided by Texas A&M Forest Service

High Risk Fuels

High risk fuels on the High Plains and lower elevations of the Trans Pecos include above normal amounts of grass mixed with small amounts of brush. The common characteristic shared by historical high impact wildfires in this region is the extreme rate of spread they exhibit in the grass fuel bed. West Texas is known for the high winds that accompany the frequent frontal passages during the spring season. Extreme fire weather that includes windspeed in the 30–40 mph range can drive a wildfire to speeds of over 6 mph. This may not sound that fast but in March 2006, a wildfire starting near Borger, Texas covered over 50 straight line miles in eight hours and threatened several communities along the way. In April 2011, a fire starting in Marfa, Texas ran through the town of Fort Davis about 20 miles from Marfa.

The speed of these fires and others burning in the dominant grass fuels will outpace the containment efforts of firefighters and allow little reaction time for those that find themselves in the path of this type of wildfire. Grass dominant fuels are not widely regarded as a high risk fuel because they lack the intensity and longer burning duration of fuels that contain timber and brush. Grass fires, like tornados, may be relatively short lived, but can and have had devastating impacts on lives and property.



The image to the left shows the contrast between the high risk above normal grass loading on the right side of the fence compared to the below normal, heavily grazed grass loading on the left side of the fence. This Roberts County grass dominated fuelscape is similar to the fuels and terrain that supported the 50 mile long Borger fire in March 2006 and the more recent Crutch fire that burned portions of four counties (including Roberts County) in March 2016.

Above normal fine fuel loading in broken terrain can be seen in the picture below of the 2016 Crutch fire. This fire ran over 13 miles on the afternoon of March 23 and was less than one mile away from entering the town of Pampa when forward progress was stopped. The fire progression slowed when it ran into numerous short grass agricultural fields just outside of the city. The slower rate of spread in the short grasses allowed firefighters to stop the forward progression of the fire.





There is one other high risk fuel type in the West Texas region that deserves discussion here. The grass and brush fuels associated with the rugged terrain of the Trans Pecos Mountains will support long duration wildfires that are highly resistant to control. The ratio of brush to grass generally increases with an increase in elevation. Grass is more dominant at the lower elevations and west facing slopes. Brush species such as juniper, pinyon pine and oak brush is more dominant in the higher elevations and northeast facing slopes. The mountainous terrain that supports these fuel associations certainly contributes to a wildfire's resistance to control.

The 2008 Cathedral Mountain fire located between Alpine and Marathon burned 23,000 acres in a grass brush fuel type. The rugged terrain encountered here multiplies the resistance to control and limits the type of suppression resources that can be deployed. Shown here is a 20-person handcrew that will construct fireline with hand tools in the steep and rocky terrain.



Here is an example of a high risk grass brush fuel type with a more dominant brush component. This picture was taken on the 2011 Iron Mountain fire which burned in the Glass Mountains just north of Marathon, Texas. The pinyon pine and juniper brush fuels increase fire intensities but there is still enough grass present to facilitate moderate surface fire spread. The pinyon pine in the right foreground is showing drought stress from the increasing 2011 drought.



Shown here is a high risk grass brush fuel type typically found in the Davis Mountains. A 50/50 mix of brush and high load grasses combined with the mountain topography produces a wildfire that can both spread quickly in the grass and burn intensely in the brush.

Grass and Brush

Despite all of the previous illustrations of high risk grass and brush fuels, not all grass brush fuel types should be considered high risk. One very common grass brush fuel type includes mesquite as the dominant brush species. Mesquite has a thin or sparse canopy that does not support high intensity canopy fire as do many evergreen species like juniper and pine. Mesquite is generally found growing in deeper soils associated with flatter terrain.



This 2011 wildfire on the outskirts of Odessa shows the above normal grass loading that was common in 2011. The mesquite will add some intensity to the grass fire but very little when compared to the intensity added by evergreen brush species. The lack of slope does not restrict the type of suppression resources that can be used and does not significantly restrict access to the fire.



The desert grass brush fuel type can be found on the lower slopes of some of the drier mountain ranges in the West Texas region. The picture here shows a mix of grass and brush along the Foothills trail in the Guadalupe National Park. The arid, rocky slopes will not support the amount of grass loading that we have seen in the high risk fuels of the High Plains and Davis Mountains. The brush here contributes to the fire

intensity but the desert brush height is much shorter than what we saw in the less arid Glass and Davis mountains. This desert grass brush fuel type is also common in the Big Bend region of West Texas.

Grass

One last fuel type to discuss is the pure grass stands that are found in many parts of the High Plains and Southern Plains of the West Texas region. Much of the region from north of Amarillo to south of Lubbock is currently in crop production or has been in the past. The Department of Agriculture established the Conservation Reserve Program (CRP) back in the early 90s to provide an incentive to farmers to convert marginal cropland back to native grassland. The agreement did not allow the converted grassland to be grazed or mowed. The CRP grasses soon became a common term or reference in the wildland fire community. Wildland firefighters noticed increased fire occurrence in this CRP fuel type

and recognized that fires burning in the higher grass fuel loading of CRP grasses were more resistant to control efforts.

The good news is that most CRP land is located in flat terrain common to cultivated land. There are generally a number of roads nearby which allow access for suppression equipment and act as barriers to fire spread.

Left: A Floyd County fire from February 2016 burning through CRP grasses





Left: Collingsworth County
CRP grasses

Central Texas Overview

As the name of this fuel ecoregion implies, the central region sits squarely in the center of the state. This region includes the rolling limestone hills of the Hill Country, the Lost Pines area east of Austin, and the densely populated zone commonly referred to as the I-35 corridor that crosses the central region from Waco to San Antonio.

The major transition in fuel composition occurs from east to west. There is a higher density of timber fuels, both hardwood and pine, on the eastern side of the Central Texas region. Moving west, the timber density will decline and is replaced with a brush component. Eventually, grasses become the more dominant component on the western extent of the Central Texas region.

There are normally two periods of increased fire activity in Central Texas. The winter/spring period is dependent on freeze cured grasses being in place. In addition, peak fire activity for the winter/spring period will coincide with the peak frontal passage activity that runs from mid-February through mid-April. The majority of the winter/spring period fire activity will occur left of center in the central region where more grass is present in the fuelscape. The second period of increased fire activity can occur during the late summer/early fall drying season. This activity occurs most often in the timber and brush dominant fuelscape in the eastern half of Central Texas.

High Risk Fuels

The most destructive wildfire in Texas history when measured by homes lost was the September 2011 Bastrop Complex fire that destroyed over 1,600 homes in the Lost Pines region of Central Texas. The combination of a pine timber overstory and mixed brush understory that includes yaupon brush is a high risk fuel type in Central Texas just as it is a high risk fuel type in East Texas.

The image below was taken on a fire near Smithville in July of 2013. This picture illustrates how a surface fire can use the understory brush like the yaupon in the right foreground to climb into the pine overstory. The resulting crown fire creates extreme fire intensity and is highly resistant to control.



Much of the Hill Country supports what many people call an oak savannah. This combination of timber, brush and grass is widespread along and west of Interstate 35. The percentage of each component (timber, brush and grass) may change depending on the location within the region but this fuel type is a fire effective fuel and has been associated with numerous significant wildfires.



The timber component and the crown fire potential that it creates require that this timber, brush and grass fuel type be included in the high risk category.

This picture was taken in Hays County in November of 2010 prior to the historic 2011 fire occurrence. The above normal grass fuel loading seen here was a contributing factor in the level of fire activity in 2011.

Grass and Brush

There are many configurations of the grass and brush fuel type in Central Texas. Configurations that have a higher percentage of grass tend to support higher rates of spread. Configurations that include a higher brush tend to spread a little slower but burn more intensely.



This view near Ozona in Crockett County highlights a high concentration of juniper brush mixed in with grass. The juniper pictured here is growing close enough together that it could support crown to crown fire movement if high wind conditions were present.



This hilltop near Sonora in Sutton County supports a grass brush fuel with a higher percentage of grass. The juniper brush and a few scattered live oak mottes are not concentrated enough to slow the fire spread through the grasses. The above normal grass loading seen here was a major contributing factor for the 2015 late summer fire activity in the southern Hill Country.

Drought Modified Fuel Types

Drought is never that far from recent memory in Texas it seems. Texas drought in the mid-1950s and the more recent 2011–2013 drought brought changes to the landscape of Texas. Though not a characteristic of a fuel type, drought can change the percentage of brush, grass and timber within a fuel type and will also alter the amount or ratio of live and dead fuel within a fuel type. Fuel type modifications are still present from the 2011 drought. Drought mortality was widespread in Central Texas so this seemed an opportunity to document the effects of the recent drought and provide expectations for future droughts.



Shown here is a large area of oak mortality along the Blanco/Gillespie County line near Fredericksburg. The oak mortality adds dead fuel to the surface fuel loading. It also opens up the canopy allowing more sunshine to the surface which will promote an increase in grass production.

Here is a striking aerial view of ridgetop juniper mortality in Kimble County near Junction, Texas. The juniper drought mortality and the above normal grass fuel loading helped to fuel the late 2015 summer fire activity in this area.



South Texas

The South Texas region as defined here encompasses a number of unique ecosystems. The Rio Grande Valley at the southern extent of the region has a subtropical climate with hot summers and mild winters that see only rare winter freezes. There is also a distinct coastal region along the Gulf Coast with almost 9.5 million acres of coastal prairies and marshes. South Texas is probably best known for the large expanse of South Texas plains often referred to as brush country. The brush country has long been used for grazing and is known for some of the large ranches in this region like the famous King Ranch located near Kingsville. More recently land use practices include treatments that favor whitetail deer habitat to enhance the popular hunting industry in this region.

There are generally two separate periods of increased fire activity in South Texas. The most active period is the winter season when grasses are freeze cured or drought cured. Wildfire activity during both periods is highly dependent on having enough grass fuel loading to burn. The silver lining of a drought in South Texas is that there is not enough grass to support wildland fire activity. The second period of wildfire activity can occur during the late summer or early fall seasons when 100 degree days and little if any rainfall can cure out the grass fuels. The wildfires in the spring are usually large wind driven wildfires that occur after a cold front has passed through. The dry continental air behind the front and strong post frontal north winds can produce wildfires in excess of 10,000 acres on the large expanses of grass and brush fuels in the South Texas plains. The late summer fires tend to be smaller in size but burn with higher intensities as they burn in heavier brush and some timber fuels.

The Rio Grande Valley is one of the most densely populated areas in the region with a large but shrinking amount of crop land. Land ownership sizes are smaller and do not support large expanses of unbroken wildland fuels. Wildfires are smaller on average in the Rio Grande Valley but due to the dense population here the fires do not have to be large to have a high impact on improved property.

High Risk Fuels

The grass and brush fuel type is widespread across the South Texas plains and has produced the largest and most damaging wildfires in this region. There are numerous configurations of this fuel type that include a variety of different brush species along with different ratios of grass to brush. Mesquite, blackbrush, lotebush, and white brush are a few examples.



Pictured here is a grass and brush fuel type from Dimmit County about 12 miles southwest of Cotulla. It is a slightly grass dominant mix of grass and brush with brush heights ranging from 3–12 feet in height. The above average grass loading seen here could support forward spread rates in excess of 4 mph in a high wind, post frontal environment.

A higher concentration of mesquite brush mixed with less grass will not support the high rate of spread as noted above. The dense brush mix here will burn more intensely and persist longer than the grass dominant example above. Even though the terrain is mostly flat, the dense nature of this brush mix can restrict access to all but tracked vehicles such as dozers.



Timber Fuels

There are limited amounts of timber fuels that can be found along the rivers and near some of the coastal areas. The mixture of oak with a brush understory that includes yaupon brush has the most potential to support wildfire activity. This is especially true in the late summer drying season when fire activity centers on the fuel types with higher concentrations of brush and timber.



This stand of oak with a yaupon brush understory is close to Garcitas Creek just east of Victoria. Fires that become established in this fuel type can be very resistant to control.

This is actually a mature stand of mesquite brush with a closed canopy. The closed canopy shades out the surface which prevents the growth of sun dependent grasses. Even though mesquite is considered brush, fire will move through this mature mesquite in the compacted surface litter much as it would move through timber litter. Surface fire burning here would be low intensity and slow moving.



Grass and Brush

There are also associations of grass and brush that do not reach the high risk status due to the location and expanse of the fuel type. The Rio Grande Valley has grass and brush fuels but in much smaller parcels due to the fragmented pattern of ownership in the densely populated area. The grass and brush fuels found in the eastern Coastal Plains generally have more grass and less fire effective brush species.



The La Paloma Road fire occurred in February 2016 in Starr County near Rio Grande City. The fire burned in a section of grass and brush fuels that was adjacent to a similar sized section of residential development.

The deeper, clay based soils of the eastern Coastal Plains supports a grass brush fuel type slightly different than those in the previously discussed western or Rio Grande Plains. The grass loading here tends to be higher with deeper soils. The Coastal Plains brush community is not as fire receptive as its western counterparts. Fire spreads through the grass here and underneath the brush. The brush of the Coastal Plains does not add much to the overall fire intensity.



Coastal Grasses

One of the most fire effective marsh grasses is cordgrass. The density and arrangement of this marsh grass facilitates fire spread. There is also a chemical content in cordgrass that causes increased fire intensity when it burns. This chemical content also allows cordgrass to burn under high humidity conditions when most grasses will not burn.



Notes
