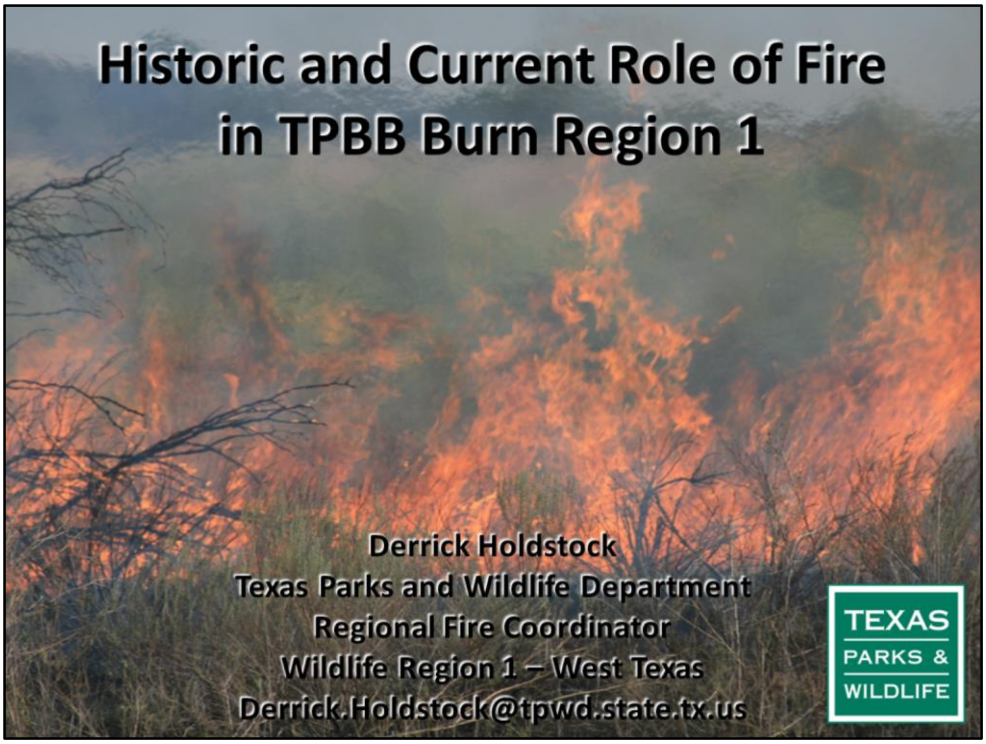
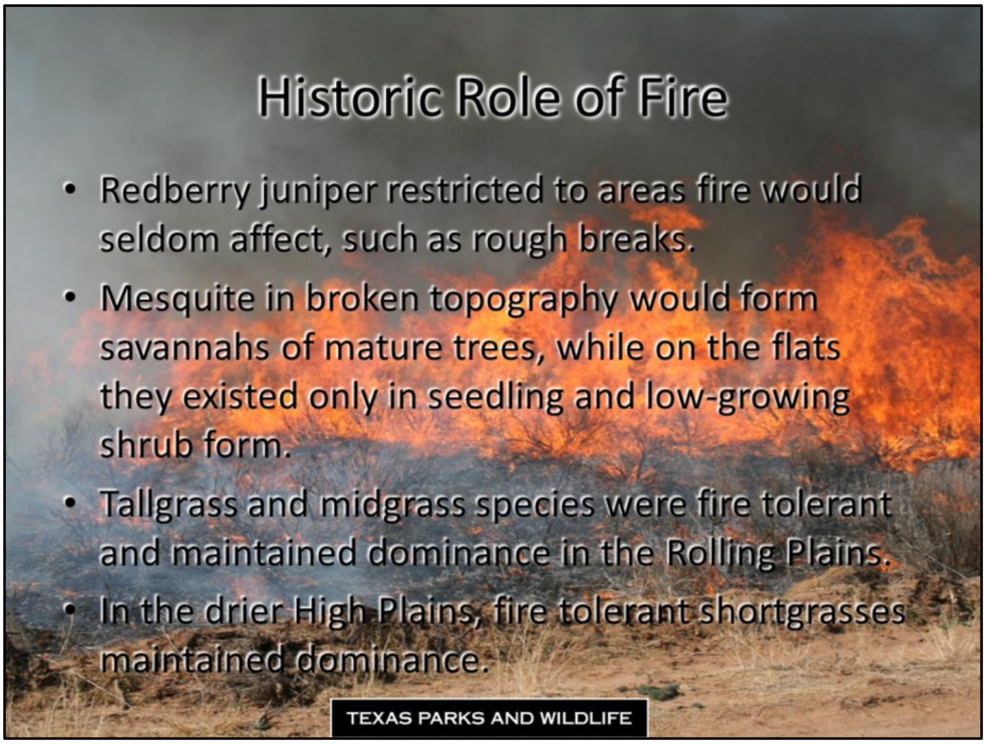


This presentation is designed to introduce the viewer to the fire ecology of the Texas Prescribed Burn Board Burn Region 1. Information has been gathered from years of experience and scientific investigation of fire and fire effects in this region. For further information on fire in this region, contact your local Texas Parks and Wildlife Department Wildlife Biologist (http://www.tpwd.state.tx.us/landwater/land/technical_guidance/biologists/), Natural Resources Conservation Service District Conservationist (http://offices.sc.egov.usda.gov/locator/app), Texas A&M AgriLife Extension County Agent (http://counties.agrilife.org/), U.S. Fish and Wildlife Service Biologist (http://www.fws.gov/southwest/es/ArlingtonTexas/West_TX.htm), or a Fire Specialist from The Nature Conservancy (http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/texas/howwework/prescribed-fire.xml). All can direct you to the information you will need prior implementing your fire program. I also recommend joining or initiating a prescribed burn association in your county (http://pbatexas.org/).

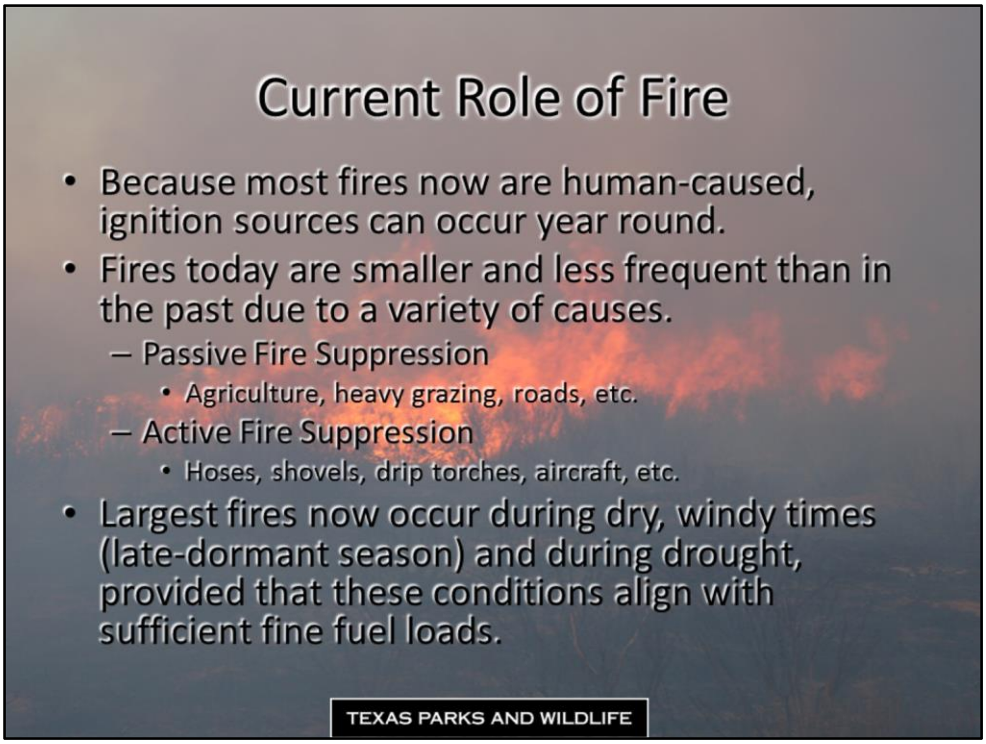
There has been a shift over time in the occurrence of fire in the Southern Great Plains, the area encompassing Burn Region 1. Prior to European habitation of the region, fires occurred as a result of 2 primary ignition sources. The primary natural ignition source was lightening, which occurred most frequently during the growing season, from mid-April through August. This resulted in intense grass fires where fine fuel loading was sufficient, particularly during droughts. Throughout most of the region, these fires would burn unchecked and were largely responsible for the open grasslands that dominated the region. Brush and trees only existed where topography and local moisture conditions resulted in a longer fire return interval, especially along canyon walls, escarpments, and drainages. Soon, Native Americans began to use fire for the purposes of attracting game species and as a means of defense. This became the primary anthropogenic ignition source. These fires often coincided with the dormant season, which lessened fuel loads in some areas and likely decreased the occurrence and size of lightening-caused fires during the following growing season. During the latter part of the dormant season, windier conditions tended to prevail and fires would often become large but would likely have burned with lower intensities than the lightening-caused fires during the growing season. This may have allowed some limited expansion of larger shrubs and trees into areas where they did not exist before the large scale burning by Native Americans.

It is estimated that the largest grassland fires historically occurred in drought years that followed 1 to 3 years of above average precipitation. The continued potential for this became abundantly clear during the historic 2011 fire season when close to 4 million acres burned in Texas. 2011 was characterized by near-record drought conditions following an abnormally wet 2010 throughout Burn Region 1, the portion of the state affected by the majority of the largest fires. Historically, these large fires during drought years and the other fires during normal-moisture years created an estimated 5 to 10 year fire return interval on level ground and something more along the lines of a 20 to 30 year fire return interval on topography dissected by breaks and along moisture-laden floodplains. It should be noted that just over 2% of the state of Texas burned in 2011, which translates to a 49 year fire return interval. As bad as 2011 appeared, and it was bad from a loss of life and property standpoint, ecologically speaking it would have been similar in acreage to a historical below average fire season due to fire suppression.

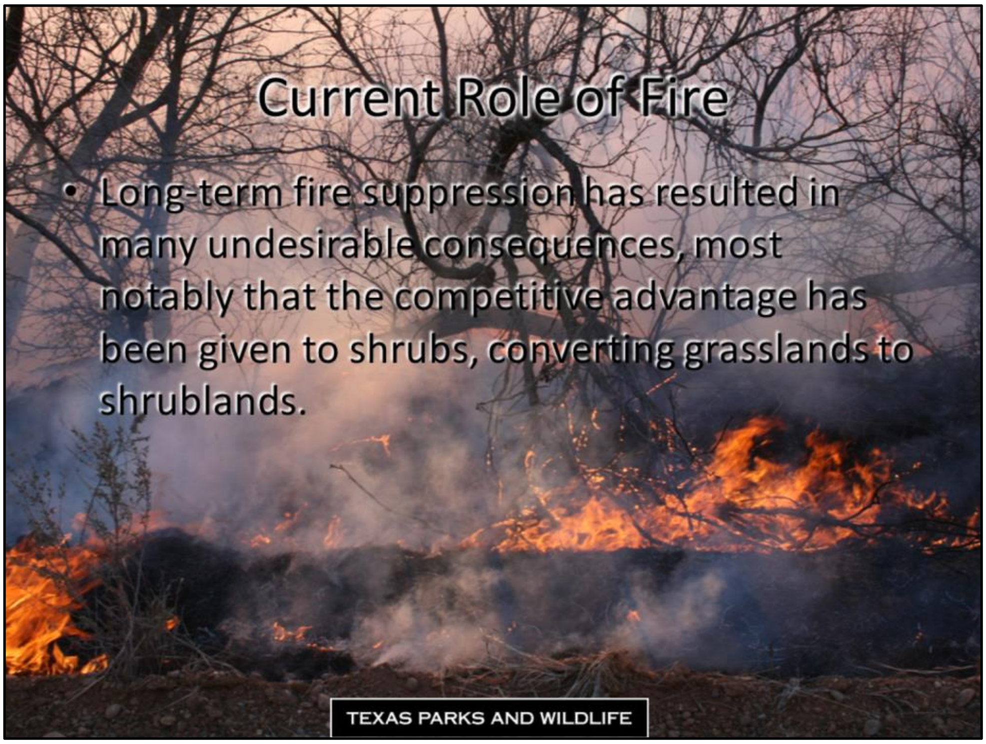
Bison existed throughout Burn Region 1 and were a part of an ecological cycle that is mimicked by many rangeland managers today in a management system called patch burn grazing. A fire would burn an area, making it black and devoid of vegetation. The burn scar would green up and provide higher quality forage than surrounding areas for a short period of time. This would attract bison and other large herbivores to the recently burned areas and effectively rest those areas not recently burned, allowing a build-up of fuel. The process would repeat itself over time.



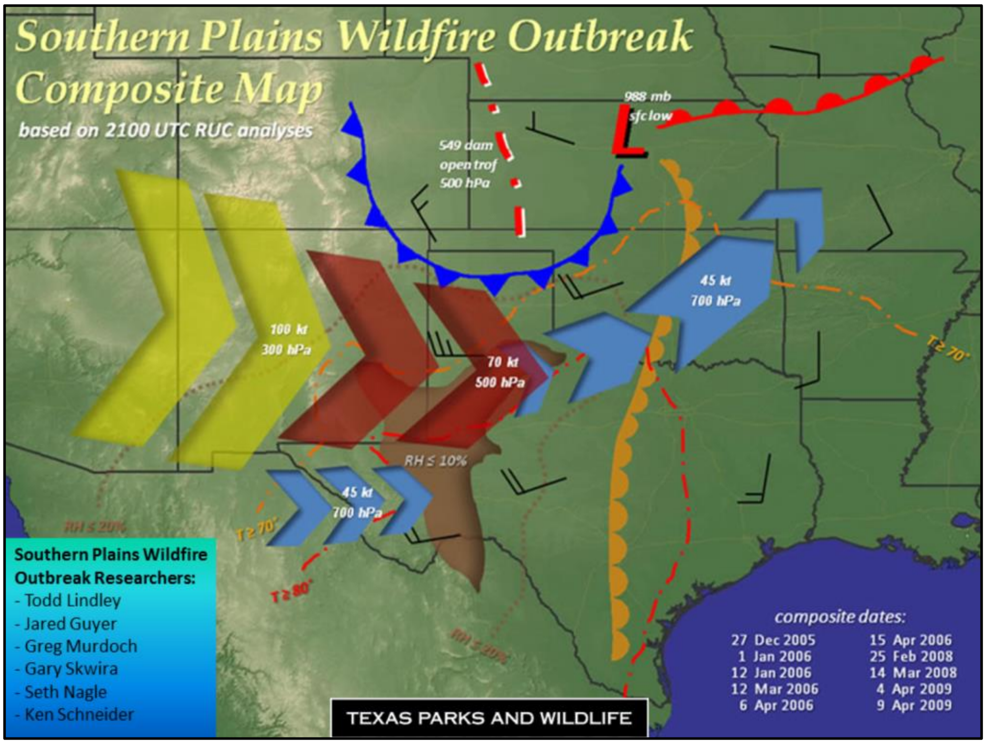
The previous slide explained one mechanism that was noted by early explorers to the Southern Great Plains on the flat uplands, particularly on the High Plains. However, brush and longer fire return intervals were noted in broken topography and along floodplains of rivers. Redberry juniper was historically restricted to escarpments along the edge of the Caprock (the geologic feature separating the High Plains from the Rolling Plains) and in other rough breaks and gravelly sites where greater amounts of bare ground resulted in a lower fire frequency or intensity. Similarly, mesquite could occur in large shrub or tree form here, as well as in floodplains where local moisture regimes reduced fire frequency. Where mesquite was documented by early explorers on flatter and drier areas, they were described as being in seedling or low-growing shrub form, which can be easily maintained by frequent fire. Most grasses are fire tolerant and, thus, maintained dominance where fire was frequent.



Fire regimes have changed greatly since European settlement of the Great Plains. Fires now are typically much smaller and less frequent than they were historically despite there being a far greater amount of ignition sources. These human-caused ignition sources can occur throughout the year rather than just during particular seasons. These smaller and less frequent fires are due to passive and active fire suppression. Passive fire suppression describes an area's ability to extinguish fire without the assistance of man. For instance, in the High Plains it is rare for a fire to travel very far before being stopped by something that is unburnable, such as a road, a plowed field, or a heavily grazed pasture. Active fire suppression describes the actions of firefighters to suppress a fire to protect human life, structures, improvements, forage, or just because a fire is burning unchecked. Because of passive and active fire suppression, fires now typically need the help of red flag conditions and/or drought to become large, provided that these conditions are aligned with the presence of sufficient fine fuel loads.

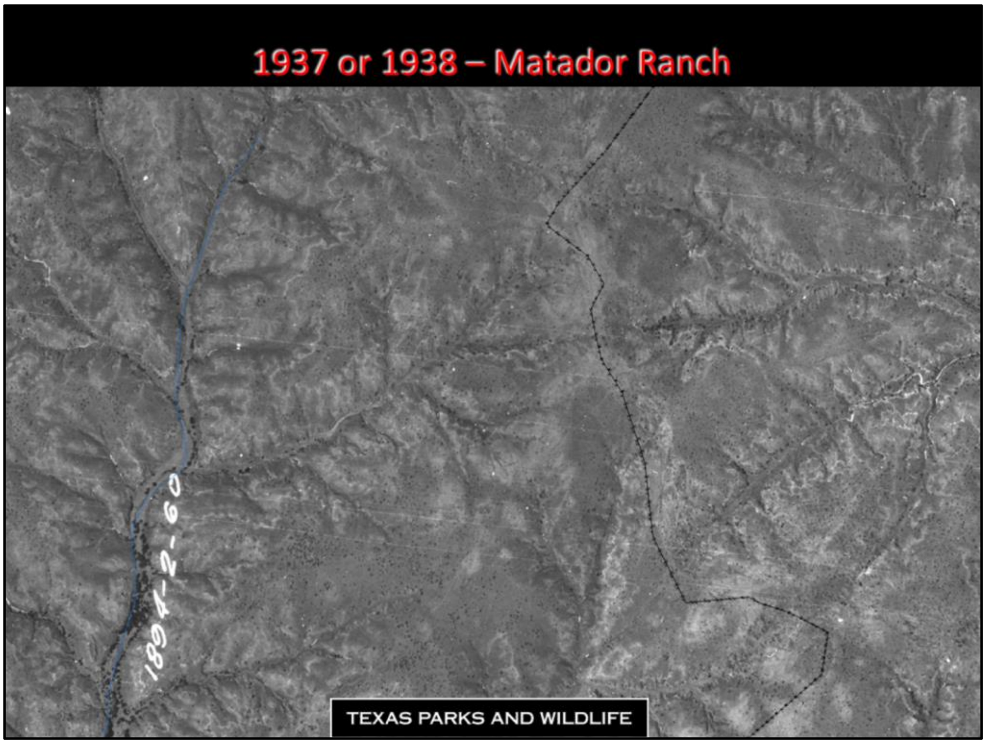


In addition to fires now being smaller and less frequent, when they do occur they typically have more severe fire effects than they used to. This is consistent with a predictable pattern seen across the United States in areas where fire regime has been altered by human activity. Fire regime is made up of 2 components, fire frequency and fire severity. Because the decrease in fire frequency has lead to brush encroachment, this has caused an increase in fire severity when a piece of ground finally burns. From a terminology standpoint, historic fires in the region have always been termed stand-replacing fires, because the top layer historically was composed of grasses which were totally consumed. Though the terminology has not changed, now when a stand-replacing fire occurs, such as during drought conditions, the stand that is being replaced is typically a shrub or tree layer which generates a lot more soil heating than a grassland fire.

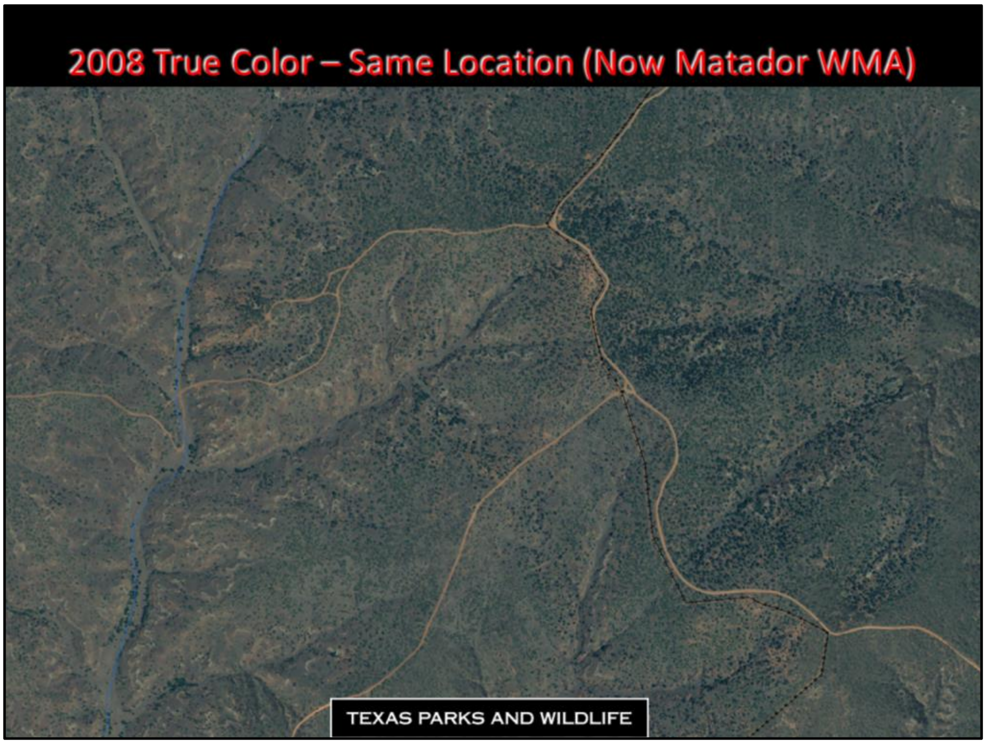


In addition to the alteration of fire frequency and fire severity, human activity has also changed the seasonality of fire in the region. With the year-round presence of humans, ignition sources are now also present year-round. Fires that previously would have not been lit by Native Americans during high wind events that are common prior to the beginning of thunderstorm season, are now often sparked off by various interactions between human activity or infrastructure and weather, such as arcing powerlines, malfunctioning equipment and vehicles, and other human-related causes. These new ignition sources, coupled with altered fuel conditions that make control of wind-driven fires more difficult, have led to the emergence of extreme weather-driven fire events, a phenomenon called a Southern Plains Wildfire Outbreak. This is a specific composite of atmospheric conditions that allows fire weather meteorologists to accurately predict when a high potential exists for an outbreak of wildfires that could quickly exceed local capabilities for initial attack. While the atmospheric conditions matching the outbreak composite have always existed, ignition sources during these non-lightening weather events historically did not. This graphic depicts the atmospheric ingredients necessary for a Southern Plains Wildfire Outbreak. Essentially, high winds aloft overrunning at right angles a surface ridge of unusually warm and dry air create the conditions necessary for very rapid fire growth and spread. The outbreak does not always align itself with the driest or even windiest weather, but rather along this “thermal ridge”, where surface temperatures are unseasonably warm. You will note that the outbreak occurs behind the dry line, meaning that thunderstorms and associated lightning do not occur within the outbreak area. This is why the recent increase in the frequency of anthropogenic ignition sources has led to the discovery of this phenomenon. In the past, the weather phenomenon occasionally existed, but the ignition sources did not.

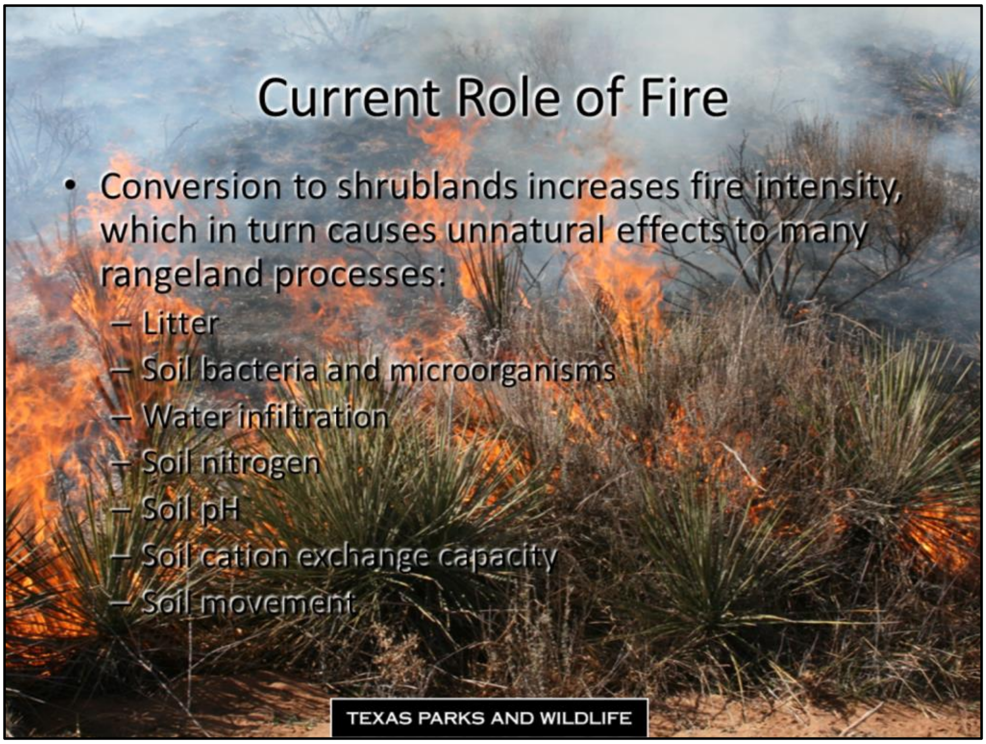
You may also notice that there is a cold front staged to pass shortly after outbreak conditions peak. Upon frontal passage, any southern or southeastern flank with uncompleted fireline will have the potential to suddenly become the head, exacerbating an already bad situation and potentially entrapping firefighters working that flank. Usually by this time, these flanks are much longer than the eastward or northeastward spreading headfire, making the new headfire much larger. Thankfully, cooler temperatures, higher relative humidities, and gradually weakening winds usually prevail in the wake of the front.



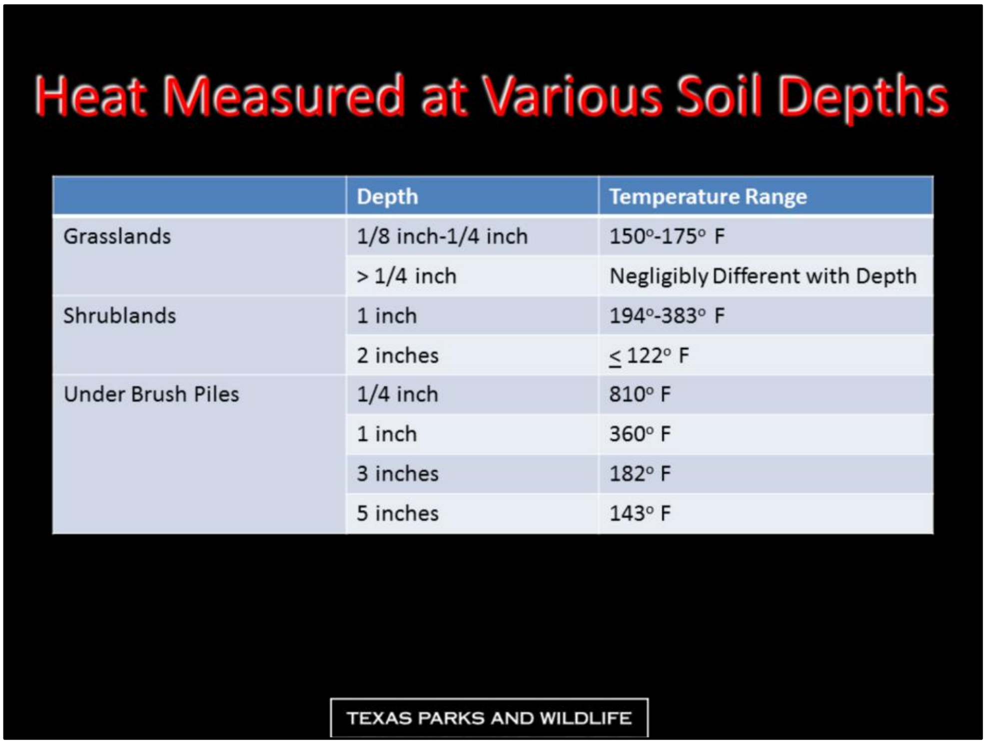
This is a photo of what is currently a portion of Lone Canyon (left) and North Middle (right) Pastures on the Matador Wildlife Management Area (Matador WMA). This aerial photo was taken in either 1937 or 1938. It depicts a mixed-grass grassland with broken topography. Notice the low brush density throughout, but the presence of occasional small shrubs, particularly near the breaks, and the presence of trees in the canyon bottoms, which were presumably wetter than they are today.



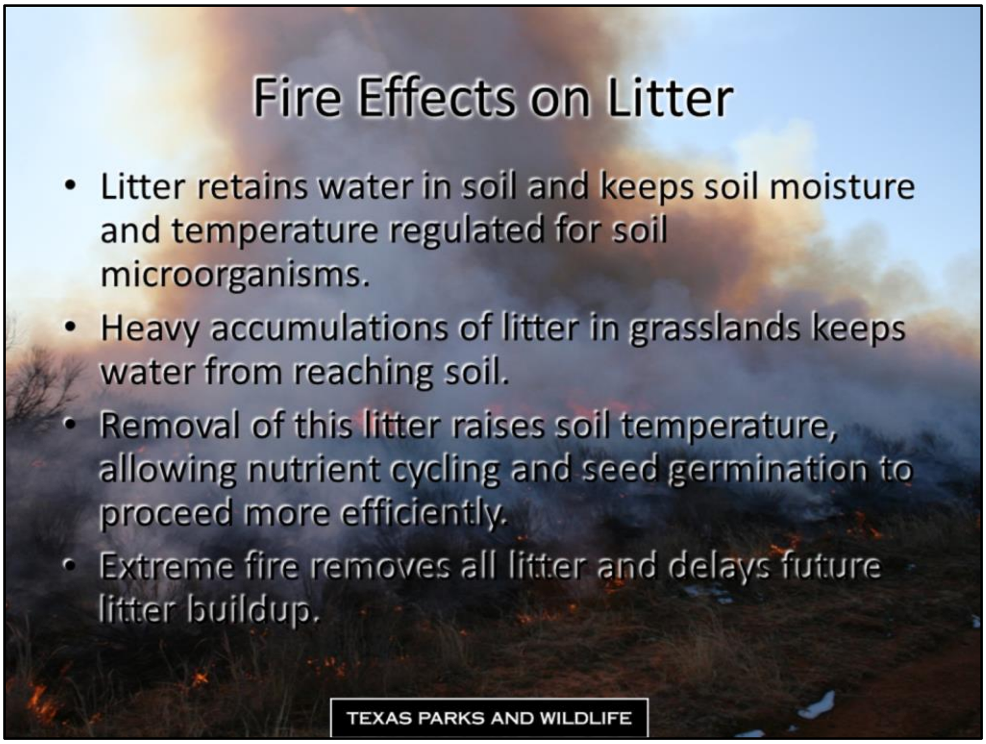
This is a photo of the same area in 2008. Note the extreme amount of brush encroachment that has occurred over the last 70 or 71 years, especially in the northeastern portion of the photo. The presence of relatively low brush densities seen elsewhere in the photo will be explained later in this presentation.



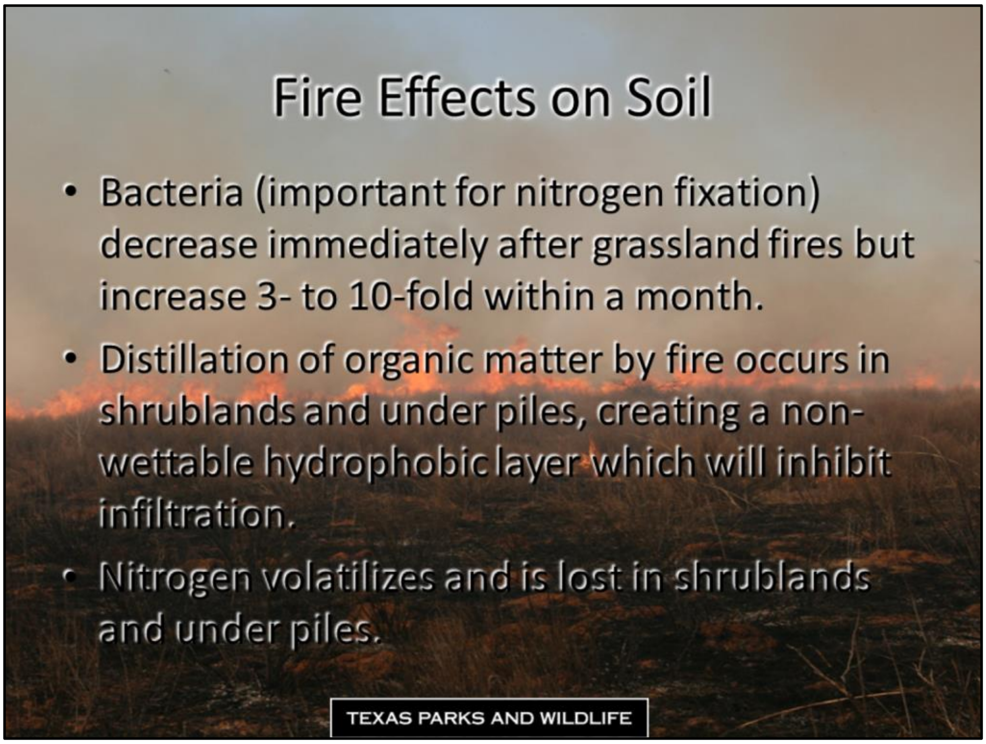
Fire in brush encroached grasslands affects things like litter, soil bacteria and microorganisms, water infiltration, soil nitrogen, soil pH, soil cation exchange capacity, and soil movement differently than fire did when grasses dominated. In many cases the effects can be severe and undesirable. The following slides go into more detail. As you view these slides, keep in mind what the fire effects would likely be under a natural fire regime in natural vegetation conditions. It is these conditions that should be the long-term goal of any fire management program because these conditions more easily allow a land manager to mimic the effects fire had historically in a grassland setting and avoid any of the current negative effects hotter shrubland fires have. In addition, grassland prescribed fires are much easier to accomplish than the more highly technical shrubland fires. With that said, fire in brush encroached grasslands may be a temporary measure used to maintain current conditions and keep them from becoming worse until it is possible for restoration to natural conditions by other means.



It is estimated that grassland fires only raise the temperature of the soil down to around ¼ inch. However, once shrubs encroach significantly, soil is heated down to between 1 and 2 inches. Under brush piles, soil can be heated down to 5 inches or more with temperatures exceeding 800°F in the top ¼ inch. Because of this, landowners should be aware that the practice of piling brush will have extremely harsh effects on the soil directly underneath brush piles. Therefore, the question following mechanical treatment is whether it is better to leave cut brush where it lays, which would produce soil heating similar to a shrubland fire, or to pile brush, which will create localized severe soil heating but will approximate grassland soil heating conditions elsewhere.



Litter on the soil surface can be good or bad, depending upon quantity. Litter in proper quantities retains water and keeps soil moisture and temperature regulated for soil microorganisms. However, when litter is allowed to accumulate over a long period of time, it can actually prevent water from reaching the soil. When litter is removed through the use of fire, there is a short-term increase in soil temperature which allows nutrient cycling and seed germination to proceed more efficiently. However under extreme conditions, such as those present during stand-replacing shrubland fires, all litter can be removed and plants may be harmed, delaying future litter buildup. A good rule of thumb is that if litter is allowed to build up to quantities greater than those that would be present under the historical fire regime, litter is probably inhibiting proper plant growth and water infiltration. It is at this point that it is probably time to burn, provided that brush has been properly managed first, or that the potential impacts from intensified soil heating from shrubland fires is carefully considered and determined to be acceptable.



In general, the hotter the fire, the greater the effect on soil and its properties. Soil microorganisms such as bacteria will decrease immediately after fire. The effect is relatively short-term, followed by an increase of 3- to 10-fold within a month after fire. However if the fire is hot enough, such as during some shrubland fires, the entire organic layer may be heated in places and the effect on bacteria can be more long-term. These hotter fires have also been known to cause distillation of organic matter which can create a non-wettable hydrophobic layer which will inhibit water infiltration. Extreme soil heating has also led to volatization of nitrogen which results in a net loss of nitrogen in the soil.

Soil pH increases after fire, but more so in shrubland fires than in grassland fires. Cation exchange capacity decreases after severe fires only and would not likely decrease after a grassland fire. As a general rule, soil loss increases with burn severity and slope. These are all good reasons to manage brush before implementing prescribed fire. If this is not possible, the landowner should at least understand the potential effects that can occur when burning in shrublands.

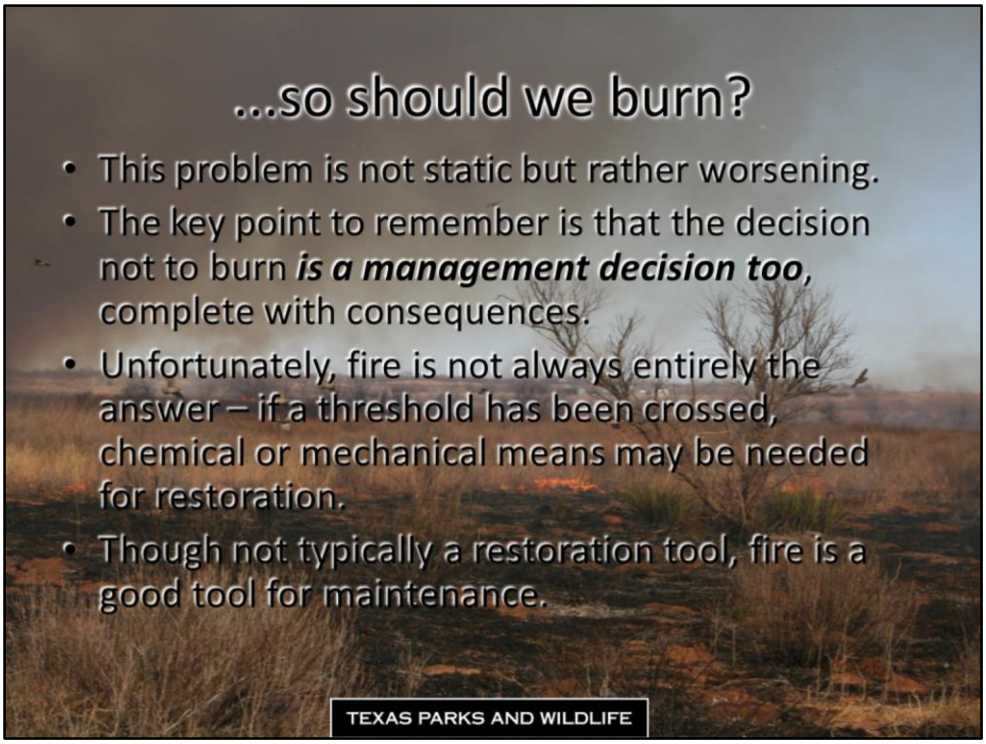
This low-altitude aerial photo shows evidence of the extreme amount of heat produced by the complete consumption of entire mature redberry juniper trees during the June 2011 Bird Ranch 2 wildfire on the Matador WMA.

While a few branches were left unconsumed,…

…most in this area were reduced to ash shadows, which is indicative of heat being present for hours and perhaps days. Extreme soil heating can be assumed to have occurred in these localized areas.

The question then is, should we burn?

Before answering that question, note the northern bobwhite quail flying through this backing fire. The birds seem to say yes!



Brush encroachment due to the removal of fire is not a static problem, but rather a worsening problem. It must be pointed out that the decision not to burn is, in itself, a management decision too, complete with consequences. In this region, every year that a piece of land does not burn is one more year worth of brush that will need to be dealt with later. As time since the last fire increases, not only does brush increase, but so does hazardous fuel loadings. This has several effects of its own. It makes burning a lot more difficult when the decision to burn is finally made. It makes the effects of wildfire (or even prescribed fire) more severe. It decreases the amount of available forage for livestock which, in the absence of lowering the stocking rate, increases grazing pressure, which in turn decreases fuel available for prescribed burning. From a grazing management standpoint, it also causes the good quality forage grasses to decrease in abundance and the lesser quality forage grasses to increase. In extreme cases, it allows invasive species to invade or expand. As was mentioned before, fire seldom makes a good restoration tool, however it serves as a good tool for maintaining the condition the range is currently in. It all comes back to objectives. If you have a native grassland with minimal brush encroachment, then fire is probably your most cost-effective maintenance tool. If you have a shrubland and your objective is to restore it to a grassland, then fire will probably not do the trick, except in extreme cases when enough heat can be generated to completely consume the live brush. However, you run the risk of all of the previously mentioned negative effects of hot fires and your long-term result still will not likely be a decrease in brush density due to the fact that most brush in our region can resprout. In the case of redberry juniper, however, you may decrease its stature enough to enter into a burning regime that will maintain this more open condition. This may be less likely with other brush species in the region, such as mesquite. If, however, you use some other means to accomplish your brush management, and follow that with a moderate stocking rate, then fire can be a great maintenance tool for your restored grassland.

Fire Effects –Shrubs Typically Controlled

http://www.fs.fed.us/database/feis/

Species	Immediate Response to Fire	Resprout	Likely Position in Community After Fire?	Expected Results from Burning
Broom Snakeweed	Mortality	No	Short-term Reduction	Good Control, but Seedlings are Quick to Reestablish
Honey Mesquite	Topkilled by Some Fires	Yes	Depends on Age of Plants	Can Maintain Community After Other Treatments
Prickly Pear	Topkilled by Most Fires	Yes	Reduced	Mortality High, but May Take 3 Years – Insect Damage
Redberry Juniper	Topkilled by Some Fires	Yes	Reduction for 20-30 Years	Mortality (Young), Reduction in Area of Influence (Older)

TEXAS PARKS AND WILDLIFE

This table, which is continued on the next slide, outlines the what can reasonably be expected if fire is used to control selected shrubs in the region. The website at the top of this and similar slides contains a wealth of information on the effects of fire on plants and wildlife.

Fire Effects –Shrubs Typically Controlled

http://www.fs.fed.us/database/feis/

Species	Immediate Response to Fire	Resprout	Likely Position in Community After Fire?	Expected Results from Burning
Saltcedar	Topkilled by Some Fires	Yes	Depends on Fire Severity	Reduction if High Severity Fire with Correct Timing
Sand Sagebrush	Topkilled by Most Fires	Profusely	Reduced Initially	Temporary Reduction in Area of Influence
Shinnery Oak	Topkilled by Most Fires	Vigorously	Reduced Initially	Temporary Reduction in Area of Influence
Yucca	Topkilled by Most Fires	Yes	Equal to Reduced	No Real Benefit to Burning

TEXAS PARKS AND WILDLIFE

As a general rule, fire will do a better job of maintaining brush densities than reducing them, but exceptions do exist. Also, growing season fire attains more top-kill, and in some cases root-kill, than dormant season fire.

Fire Effects –Beneficial Shrubs

http://www.fs.fed.us/database/feis/

Species	Immediate Response to Fire	Resprout	Likely Position in Community After Fire?
Fourwing Saltbush	Topkilled by Some Fires	Somewhat	Equal to Reduced
Lotebush	Topkilled by Most Fires	Readily	Equal
Skunkbush Sumac	Topkilled by Most Fires	Vigorously	Undocumented

TEXAS PARKS AND WILDLIFE

Some shrubs are particularly beneficial to wildlife. In general, these too are seldom reduced over the long term by fire.

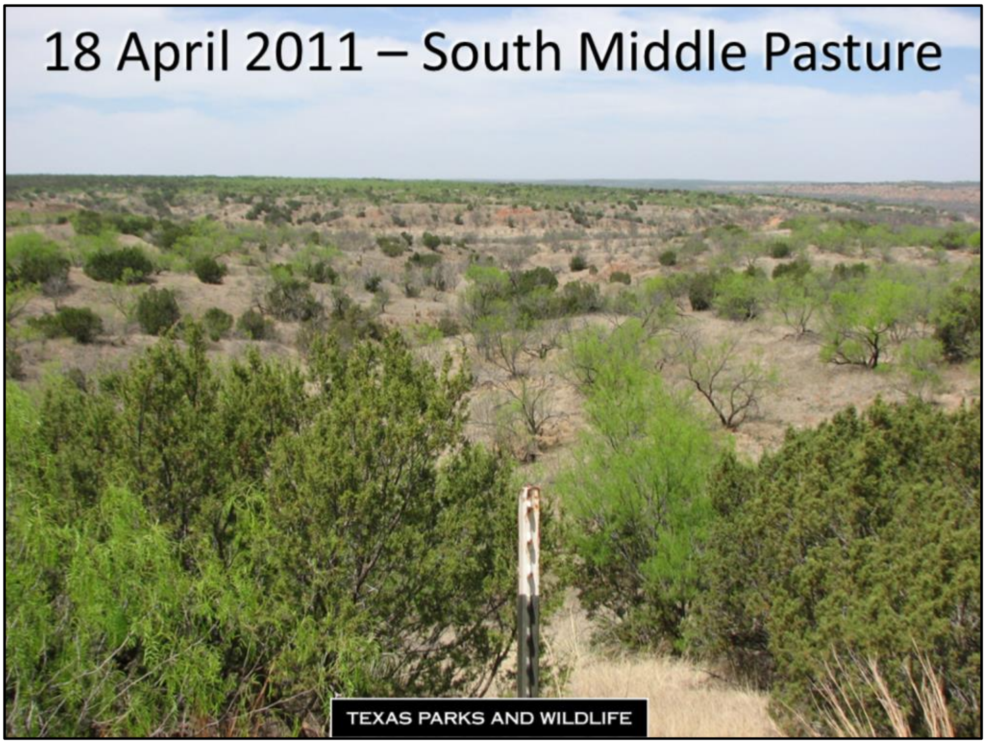
Fire Effects – Trees

http://www.fs.fed.us/database/feis/

Species	Immediate Response to Fire	Resprout	Likely Position in Community After Fire?
Black Willow	Topkilled by High Severity Fires	Yes	Depends on Fire Severity
Bumelia	Undocumented	Undocumented	Undocumented
Cottonwood	Mortality in Young Trees, Scarring in Old	Weak	Almost Always Reduced
Netleaf Hackberry	Rarely Killed	Yes	Equal
Soapberry	Undocumented	Undocumented	Undocumented

TEXAS PARKS AND WILDLIFE

The same holds true for trees, although members of the willow family, including black willow and eastern cottonwood, are usually negatively affected by fire and should be protected by the removal of shrubs in their understory that could serve as ladder fuels that would increase heating of the canopy and the cambium layer of the trunk.

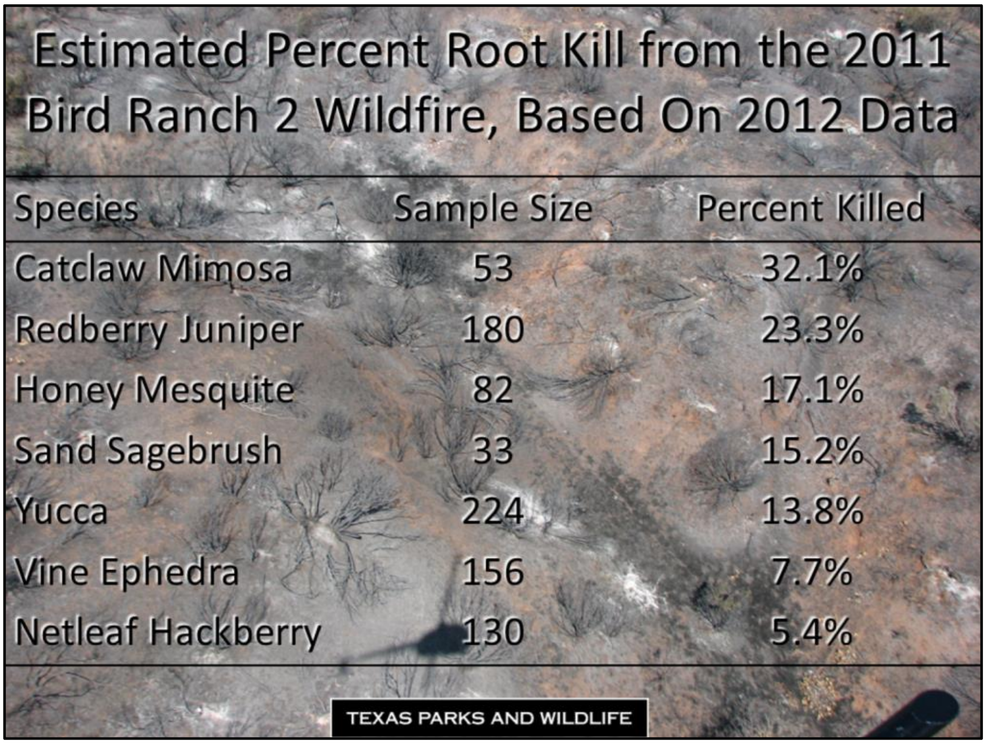


This is a one of the permanent photopoints in South Middle Pasture on the Matador WMA approximately 2 months before the Bird Ranch 2 wildfire.

This is at the same photopoint approximately 1 year later, and approximately 10 months after the wildfire. Many mesquites were not top-killed by the fire and most that were top killed sprouted vigorously at the base. Redberry junipers, on the other hand, were mostly top killed by the fire and any that did resprout did so very slowly. The reduction in cover from redberry juniper is expected to be evident for a long time to come. Grasses and forbs beneficial to wildlife responded the first year after the fire.

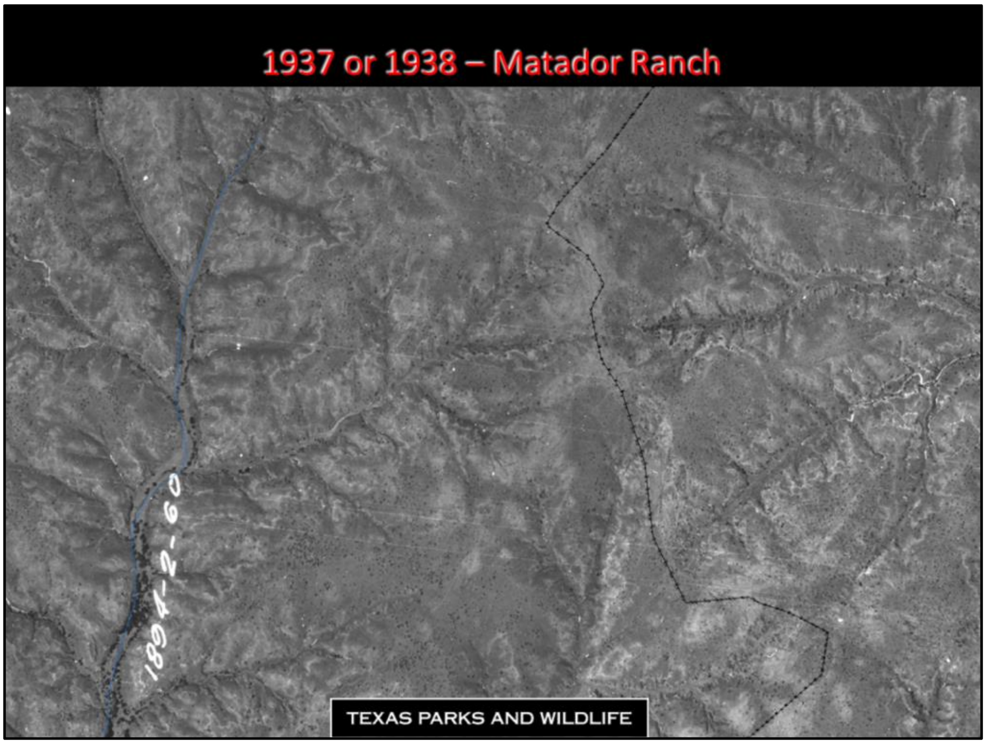
This is a different permanent photopoint, this time in East Aermotor Pasture before the wildfire.

This is the same photopoint after the wildfire. This time series shows the same patterns noted in the first time series. Unfortunately, there were no permanent photopoints set up in the area previously shown in the low altitude aerial photo where ash shadows of completely consumed redberry junipers were present.

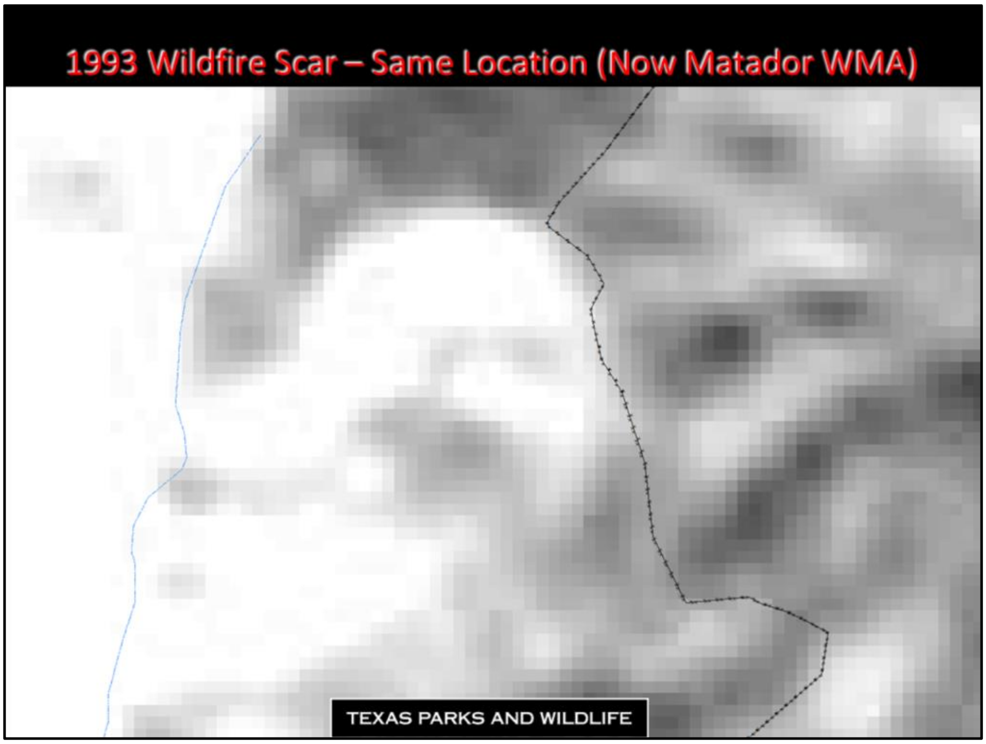


Species	Sample Size	Percent Killed
Catclaw Mimosa	53	32.1%
Redberry Juniper	180	23.3%
Honey Mesquite	82	17.1%
Sand Sagebrush	33	15.2%
Yucca	224	13.8%
Vine Ephedra	156	7.7%
Netleaf Hackberry	130	5.4%

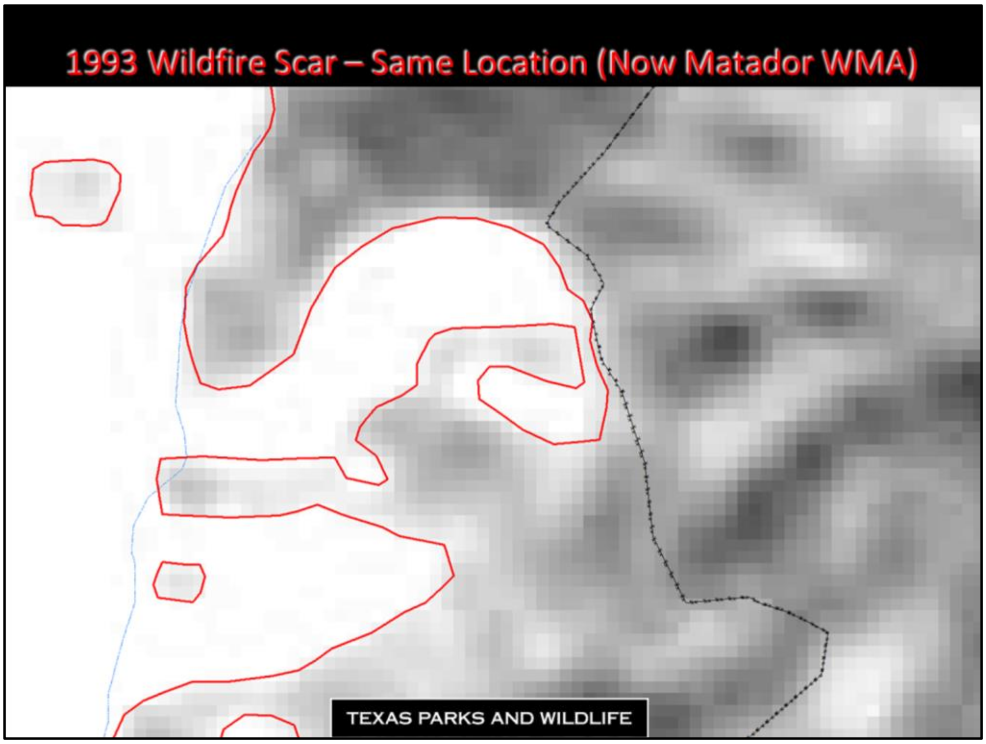
During the summer of 2012, transects inside the perimeter of the 2011 Bird Ranch 2 wildfire were sampled to determine the average fire-induced root kill for several brush species. These are the results. It must be noted that the wildfire took place during an exceptional drought year and the effects of the fire were most likely exacerbated by the effects of the drought. Lower percent kill would be expected in most years, however this may be a good approximation of the historic kill percentage that would have occurred due to fires burning during extreme weather conditions during drought years following a wet year. Another way to look at it is that this probably exceeds the best control one could hope for from any prescribed burn.



This is a black and white photo taken in 1937 or 1938 of what is now Lone Canyon (left) and North Middle (right) Pastures of the Matador WMA. At the time, this area was part of the Matador Ranch. The fence was not there at the time and is depicted for reference purposes only. The fire history of this area is unknown until Landsat imagery began being acquired at regular 8-9 day intervals in 1972. Between 1972 and 1993, there was no evidence of any fires occurring within the extent of this photo, although some short gaps do exist in the Landsat imagery. Even with the potential for gaps in imagery, it is not thought that any fires were missed.

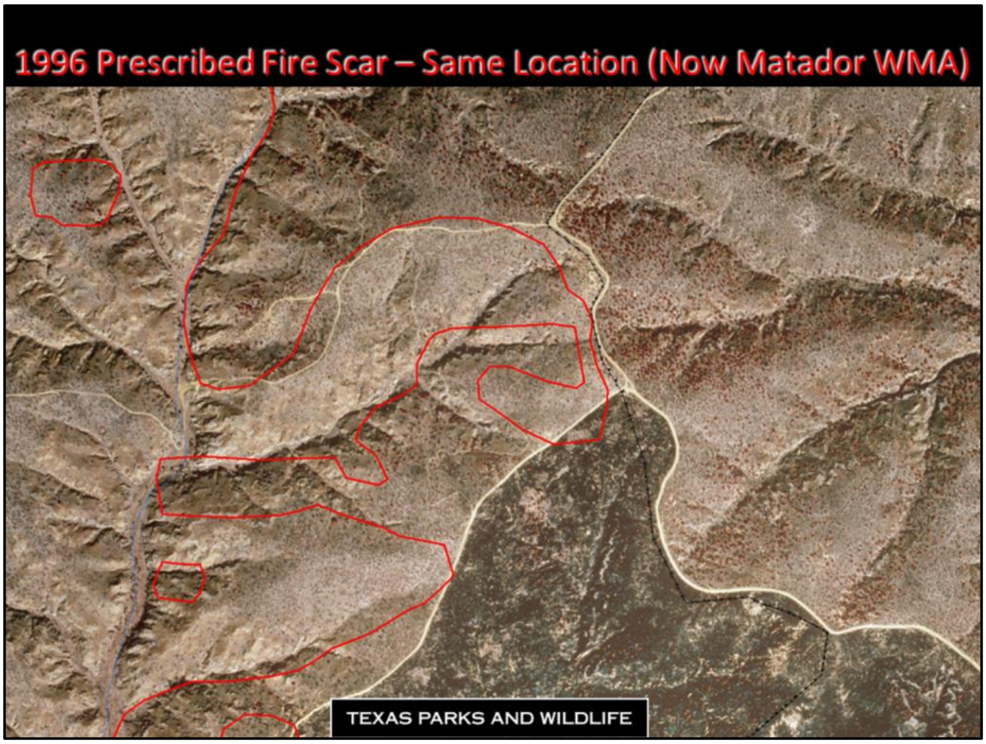


This is a low resolution thermal infrared Landsat image taken of a wildfire that burned in August or September 1993.

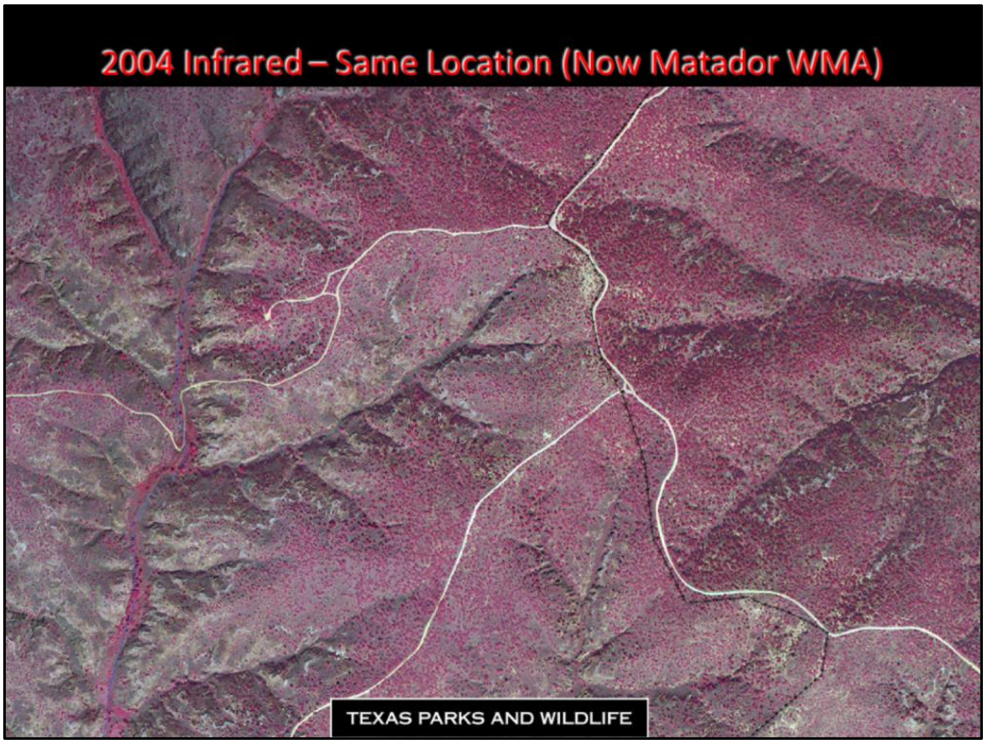


The extreme white area to the left is the area burned in the fire.

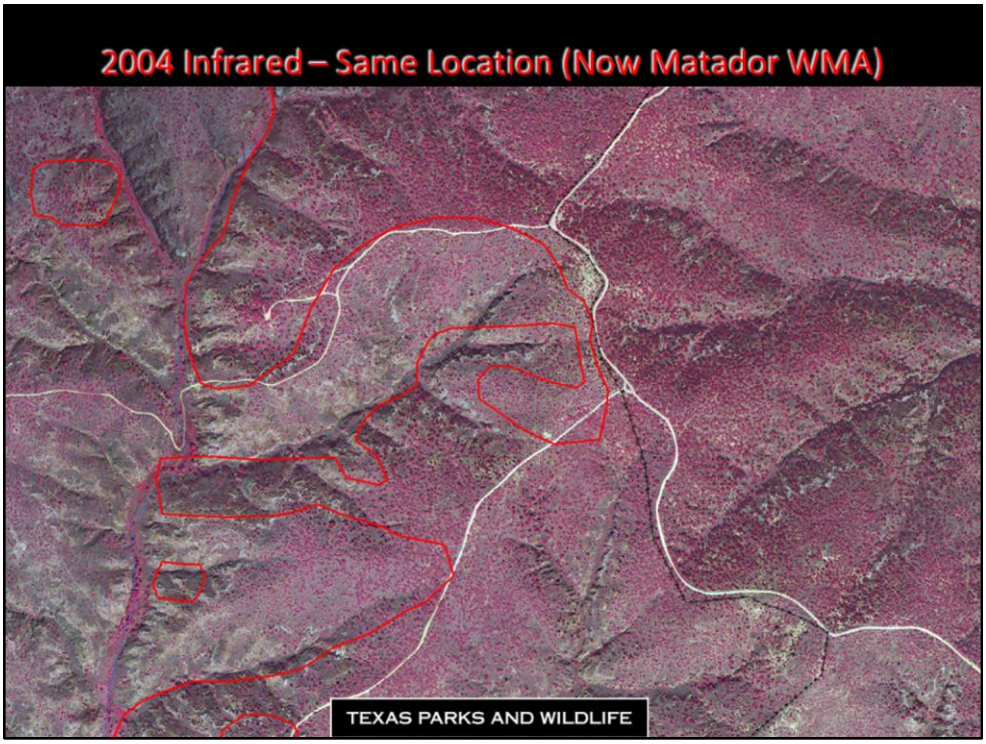
This is a color infrared Digital Ortho Quadrangle taken during the dormant season of 1996 showing a February or early March prescribed burn. Brush is mostly redberry juniper (which shows up red) and mesquite (which shows up grey in the dormant season images like this one or a paler red or pink in growing season images like the next one).



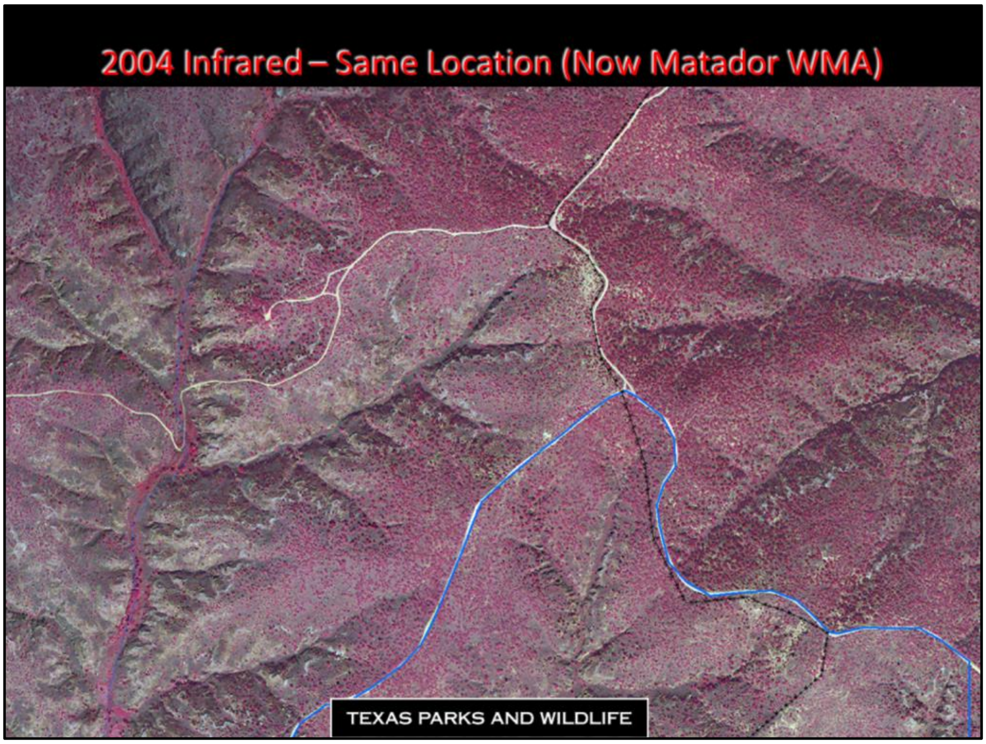
Notice that the areas burned in the 1993 growing season wildfire still exhibit low brush densities, particularly low redberry juniper densities. One could almost trace the perimeter of that fire by following these low brush densities.



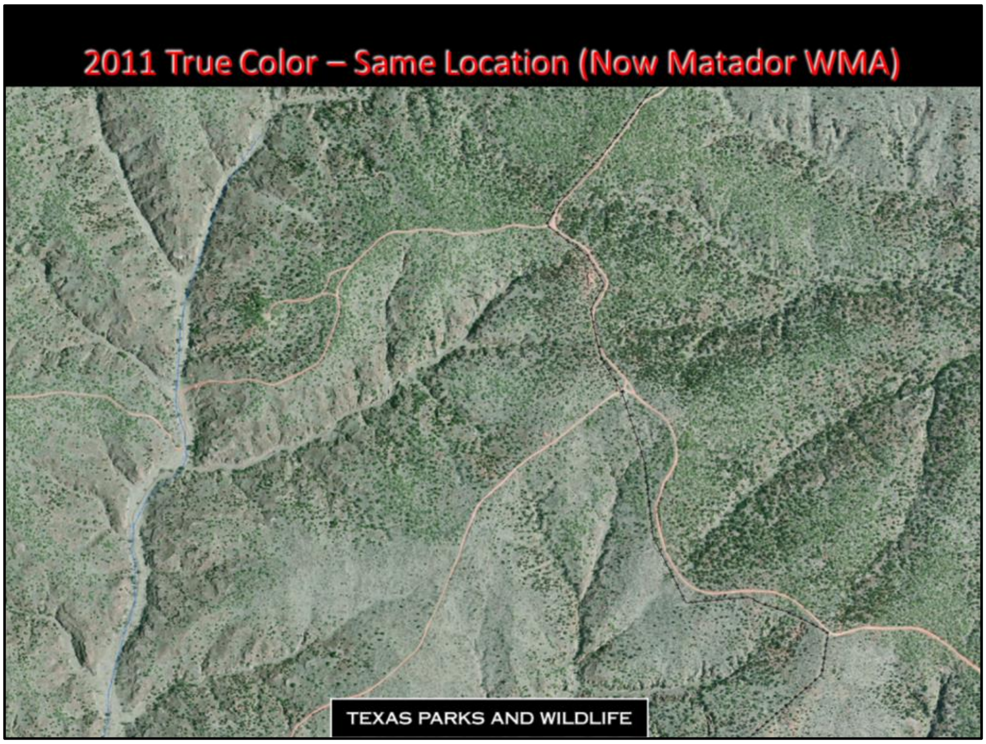
This is color infrared NAIP imagery taken during the growing season of 2004.



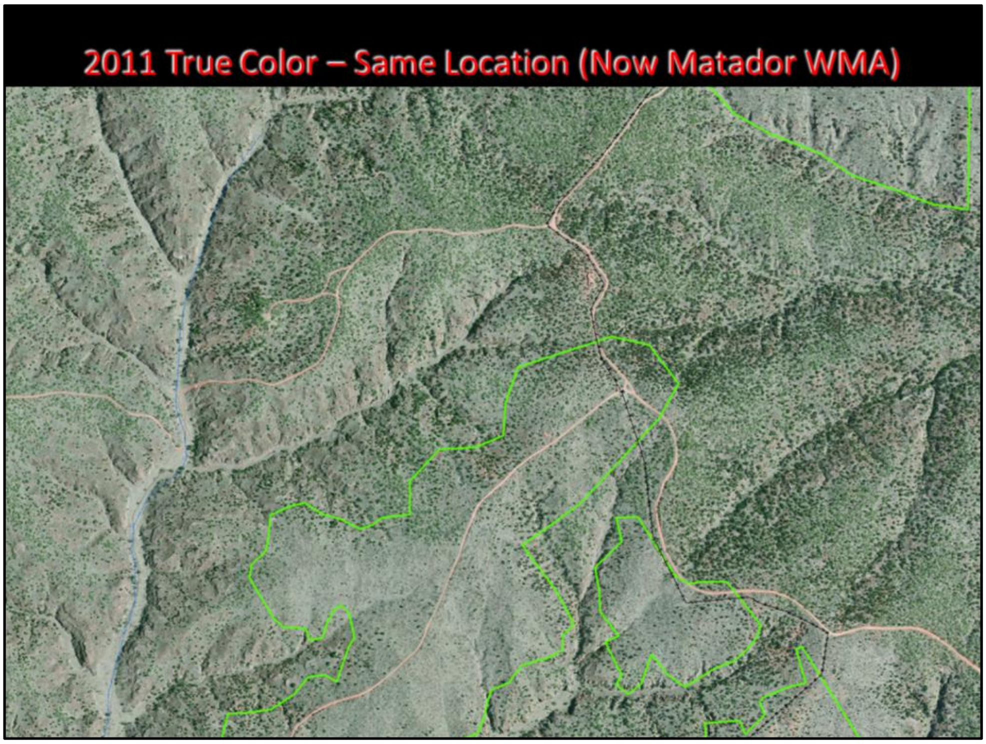
This shows brush densities as they existed 11 years after the 1993 growing season wildfire...



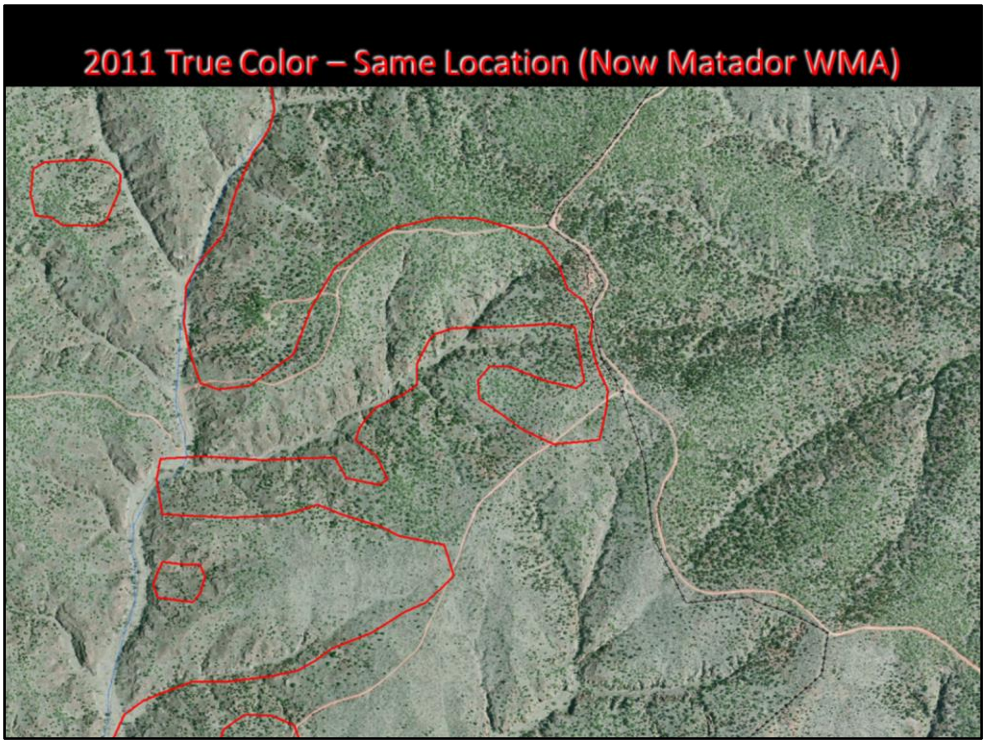
…and 8 years after the 1996 dormant season prescribed fire. One can still nearly trace the perimeter of the growing season wildfire but the more recent dormant season prescribed fire is difficult to distinguish from the unburned areas



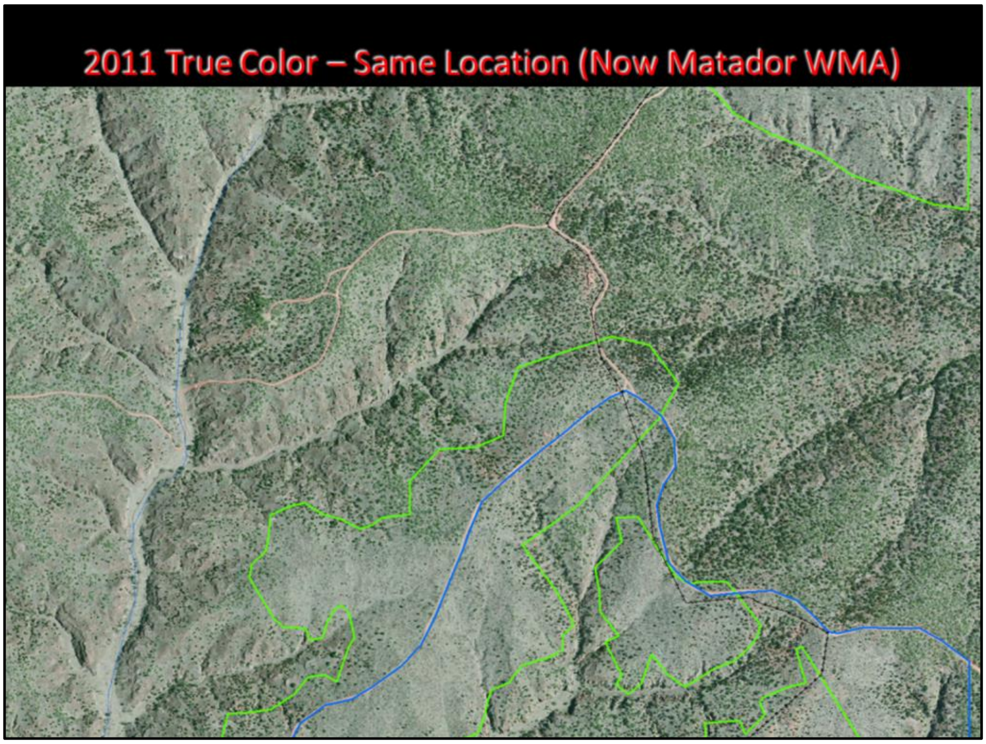
This is true color Bing imagery taken in May or June of 2011.



You will notice what looks like newer burn scars near the bottom and top right, but these are actually areas of mesquite sprayed with Remedy and Reclaim, as shown by the green polygons.



The long-lasting effects of the 1993 growing season wildfire are evident 18 years later.



The unsprayed areas of the 1996 dormant season prescribed fire and the unburned areas are difficult to tell apart and both require active management.

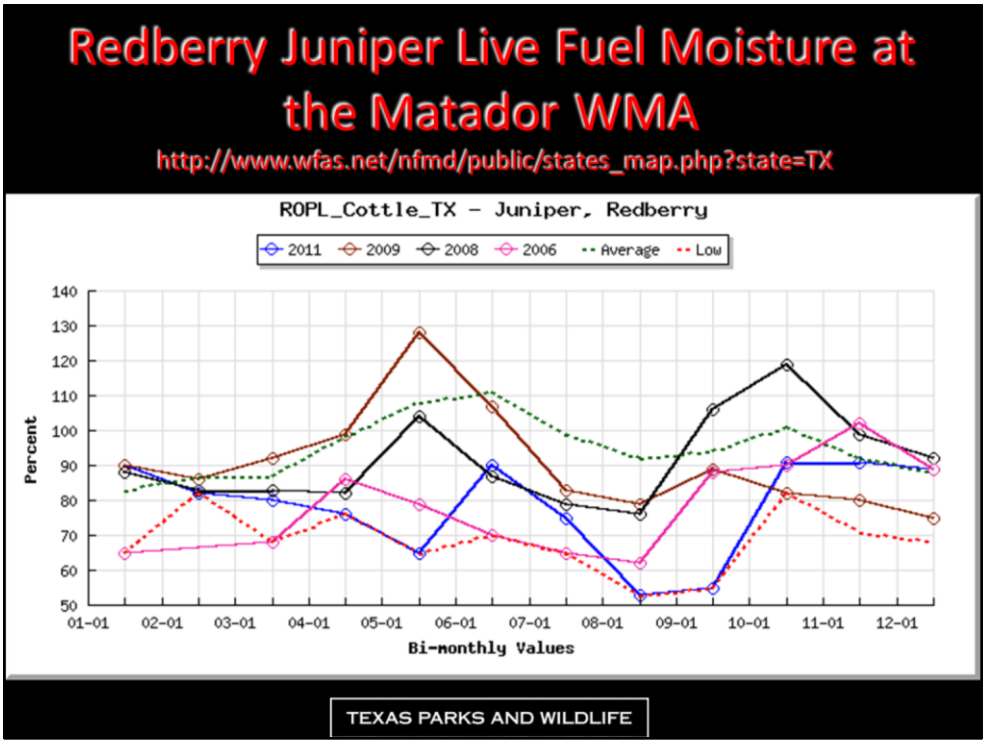
Redberry Juniper Live Fuel Moisture at the Matador WMA

http://www.wfas.net/nfmd/public/states_map.php?state=TX

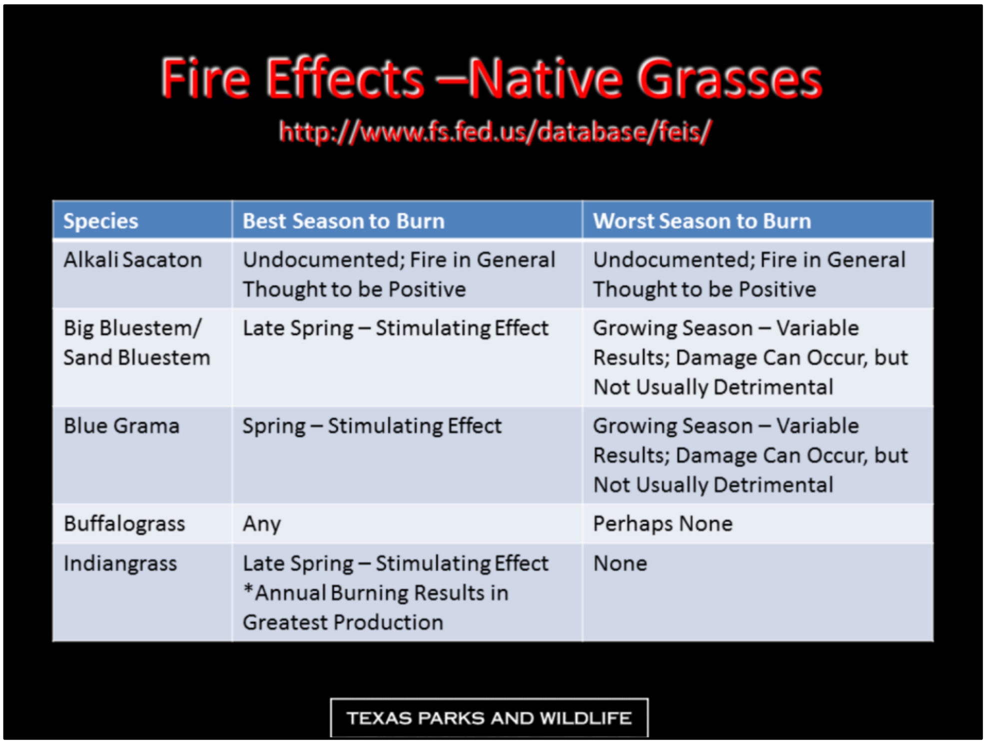
	1/15	2/15	3/15	4/15	5/15	6/15	7/15	8/15	9/15	10/15	11/15	12/15
2012	81	81	81	81	68	80	66	67	93	114	83	78
2011	90	82	80	76	65	90	75	53	55	91	91	89
2010	78	86	82	107	118	138	117	112	101	112	98	93
2009	90	86	92	99	128	107	83	79	89	82	80	75
2008	88	83	83	82	104	87	79	76	106	119	99	92
2007	89	92	108	131	147	141	146	145	133	105	90	92
2006	65	N/A	68	86	79	70	65	62	88	90	102	89
2005	N/A	93	99	108	115	123	100	100	85	86	71	68
2004	N/A	N/A	N/A	N/A	N/A	134	130	126	N/A	121	103	102
2003	N/A	N/A	N/A	N/A	N/A	N/A	N/A	73	N/A	N/A	N/A	N/A

TEXAS PARKS AND WILDLIFE

In the previous series of slides, it was not presented what the conditions were like in 1993 when the growing season wildfire made the long-lasting reduction in brush, particularly redberry juniper. Some may speculate that it was a drought year that followed an abnormally wet year. Actually, calendar year 1993 was only about 0.5” below average and the previous calendar year was only 2.6” above average. Prior to this August or September fire in 1993, rainfall came early and then shut down. The January through May time period was about 2” wetter than average but the summer period from June through September was 4.2” below average. This likely set up a situation where redberry juniper leaf moisture was below 80%. It is when this number falls below 80% that fires begin to readily consume the crowns of redberry juniper trees, provided that there is sufficient fine fuels to carry the fire to the lower limbs. This graph shows measured redberry juniper leaf moistures sampled at the Matador WMA and dried and weighed by Texas A&M Forest Service fuels specialists. It shows that it is during the average rainfall years, such as 2006, 2008, and 2009, or the drought years, such as 2003, 2011, and 2012, that this number drops to levels when canopy consumption is likely. Furthermore, within these years the value tends to drop below 80% primarily during the summer months, which makes late-growing season prescribed fire during average rainfall years a good time to consider burning for the reduction in canopy dominance of redberry juniper in this region.



This graph shows the monthly values for redberry juniper leaf moisture for 3 average rainfall years, 2006, 2008, and 2009, along with the drought year of 2011 and the average and lowest readings from the sampling site at the Matador WMA.



Species	Best Season to Burn	Worst Season to Burn
Alkali Sacaton	Undocumented; Fire in General Thought to be Positive	Undocumented; Fire in General Thought to be Positive
Big Bluestem/ Sand Bluestem	Late Spring – Stimulating Effect	Growing Season – Variable Results; Damage Can Occur, but Not Usually Detrimental
Blue Grama	Spring – Stimulating Effect	Growing Season – Variable Results; Damage Can Occur, but Not Usually Detrimental
Buffalograss	Any	Perhaps None
Indiangrass	Late Spring – Stimulating Effect *Annual Burning Results in Greatest Production	None

As mentioned before, grasses are seldom harmed in the long term by fire, although short-term effects can be negative in terms of available livestock forage. Most past research has focused on the burning of grass for the benefit of grass. While this is certainly something that can be done in grassland maintenance burns, many burns, such as those for the reduction of redberry juniper canopy dominance, must be done during a season where there will be short-term reduction in cover for some grass species. This short-term loss in cover that may last up to 3 years must be weighed against the likely long-term gain in grass cover due to the more open canopy, an effect that seems to last 20-30 years after a stand-replacing redberry juniper fire. As the tables on this and the next 2 slides are reviewed, keep this tradeoff in mind.

Fire Effects –Native Grasses

http://www.fs.fed.us/database/feis/

Species	Best Season to Burn	Worst Season to Burn
Johnson Grass	Spring – Stimulating Effect	Undocumented, but Perhaps Growing Season Fire May Cause a Reduction
Little Bluestem	Any but Growing Season – Stimulating Effect *Annual Burning Results in Greatest Production	Growing Season – Temporary Reduction or Mortality; Usually at Pre-Burn Levels by Year 3
Needle-and-Thread	Undocumented in Great Plains; Fire in General Thought to be Positive	Undocumented in Great Plains; Fire in General Thought to be Positive
Perennial Ryegrass	Undocumented; Fire in General Thought to be Positive	Undocumented; Fire in General Thought to be Positive
Purple Threeawn	None	Any – Fuel Buildup Increases Fire Residency, Causing Reduction for Several Growing Seasons

TEXAS PARKS AND WILDLIFE

Indiangrass from the previous slide and little bluestem are 2 of the 4 species that typify the tallgrass prairie that occurs east of our region. Big or sand bluestem and switchgrass are the other 2. In the tallgrass prairie, many landowners burn annually and grass cover is increased by this practice. This is not recommended in this region, as damage to the midgrasses and shortgrasses is likely with this practice. This region is also in a lower rainfall zone, so even if only tallgrass species are present, there is no guarantee that annual burning would result in positive effects.

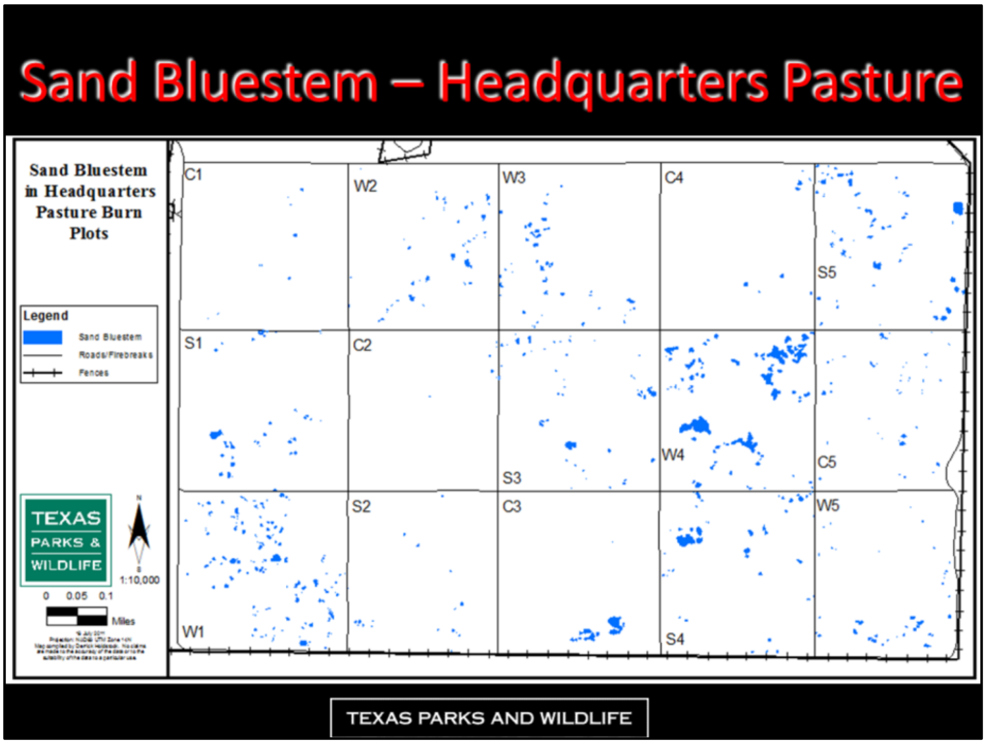
Fire Effects –Native Grasses

http://www.fs.fed.us/database/feis/

Species	Best Season to Burn	Worst Season to Burn
Sand Dropseed	Spring	Unclear, but Extreme Fire Can Cause Mortality
Sideoats Grama	Spring – No More Frequently than Every 4-5 Years	Unclear, but Almost Always a Short-Term Reduction in Cover, Usually Followed By an Increase
Switchgrass	Late Spring – Stimulating Effect	Growing Season – Variable Results; Damage Can Occur, but Not Usually Detrimental
Tobosa	Any	Growing Season – Reduction Only For First Growing Season
Vine Mesquite	Undocumented, but Late-Winter Increases Production	Undocumented
Western Wheatgrass	Spring, Summer, or Fall – Stimulating Effect	Winter – No Effect

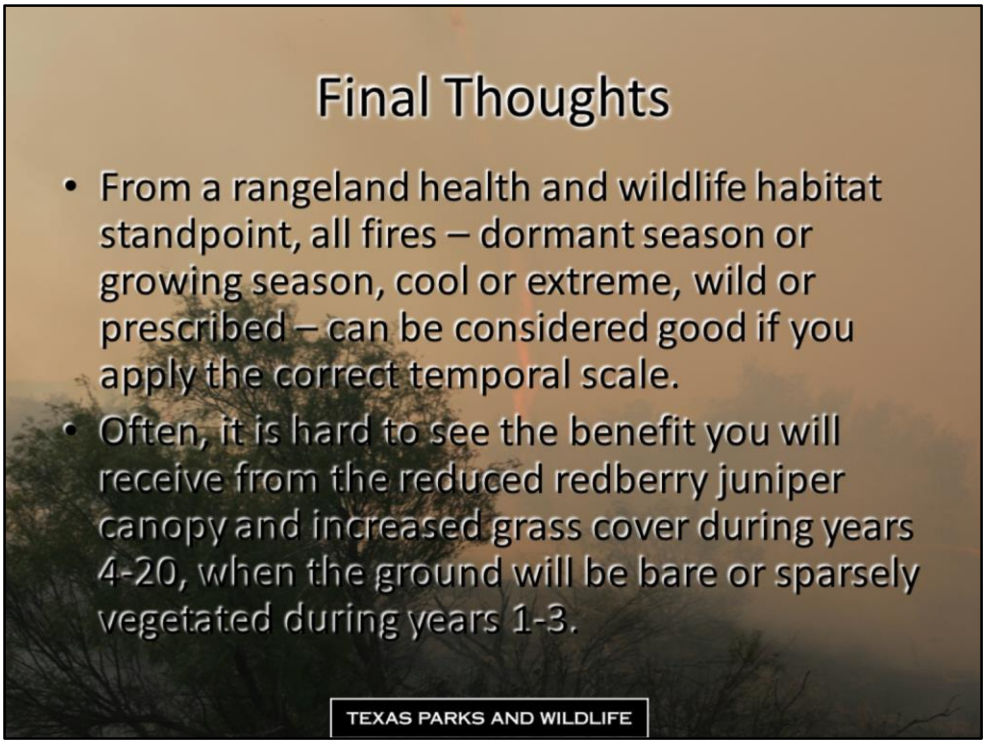
TEXAS PARKS AND WILDLIFE

Purple threeawn from the previous slide and sand dropseed are both considered increaser grasses in this region, which means that they tend to increase in the presence of heavy grazing at the expense of better quality forage grasses, termed decreaser grasses. The fact that these 2 have the greatest potential for decrease following fire is not necessarily a bad thing, as long as decreaser grasses still hold a place in the plant community.

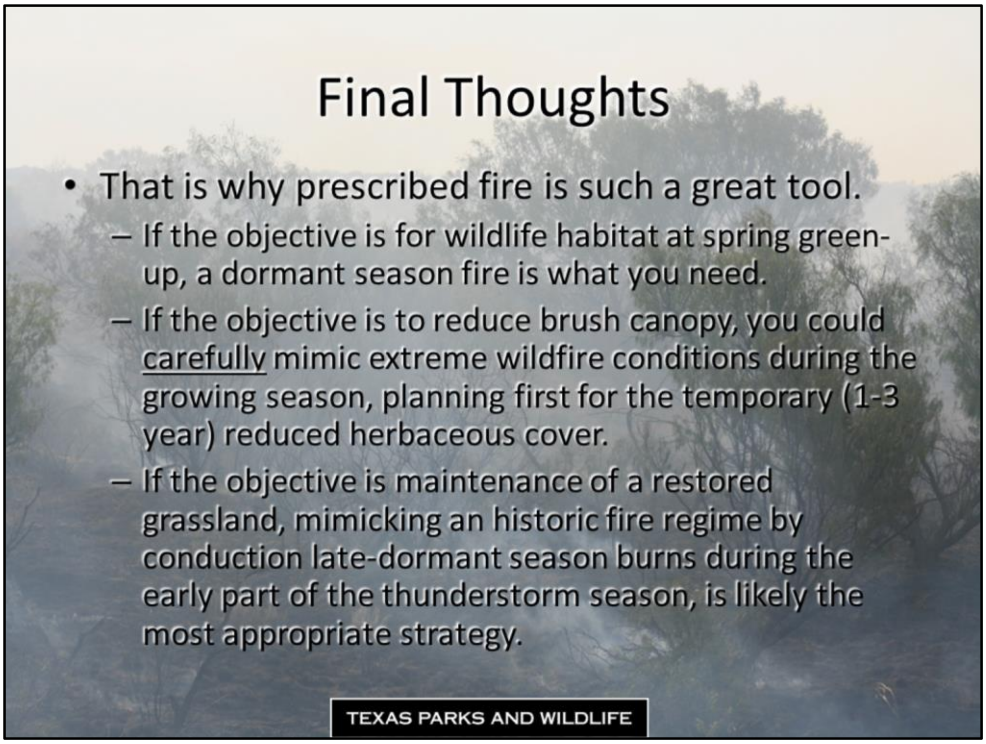


From 2005 through 2011, Headquarters Pasture on the Matador WMA was used as a research site for comparing the difference between dormant season and late-growing season prescribed fire. This is a map of the results. Dormant season prescribed fires were conducted in the 5 45 acre blocks with a label beginning with a "W" (for winter) in January and February 2005 and again in January 2009. Late-growing season prescribed fires were conducted in the 5 45 acre blocks with a label beginning with an "S" (for summer) in August 2005 and August 2008. In 2011, clumps of sand bluestem were mapped in these 10 research blocks as well as 5 control blocks, those with a label beginning with a "C". It is apparent that the blocks that were burned, especially during the dormant season, had the most sand bluestem.

This is what one of the dormant season fire blocks looked like in late-winter of 2011.



Temporal scale is very important when assessing the utility of fire within the context of rangeland and wildlife habitat management. There is little question as to whether fire is a good grassland maintenance tool, as fire has maintained grasslands in the Southern Great Plains for thousands of years. However, there is often debate over whether fire can be used for restoration of grasslands. This is where the temporal scale being used is very important. In most circumstances, fire will do a poor job of killing brush in our region, so long-term restoration is seldom achieved by prescribed fire alone, particularly dormant season prescribed fire. However, there are situations, such as the hot growing season fire in redberry juniper example, that, if followed by moderate stocking and periodic maintenance prescribed fires, deserves some consideration. What must be remembered is that when prescribed fire is used for restoring grasslands, the additional heat generated by the consumption of brush must be considered, along with the short-term harm than may come to herbaceous plants, soil microorganisms, soil processes, etc. The benefit that will be realized in post-fire years 4 through 20 (or 30) must be weighed against the cost incurred in post-fire years 1 through 3. Therefore careful planning is the key.



This is why prescribed fire is such a great tool or, I would argue, a great tool set. Much like a good socket set is designed to offer a range of sockets to fit a variety of nuts, prescribed fire can be implemented in a variety of ways to fit the resource objective one is trying to meet. A good way to know how best to tailor fire to your objective is to consider and to try to mimic its historic roles. If the objective is to provide good wildlife habitat when things green-up in the spring, then a dormant season fire similar to those lit for that purpose by Native Americans is probably what is needed. If the objective is to reduce brush canopy, realizing that repeated treatment will be necessary for maintenance, then a growing season fire under relatively dry (although not necessarily drought) conditions after significant fuel buildup will mimic natural extreme late-summer lightening-caused fires. If the objective is maintenance of the current condition, then late-dormant season burns such as those natural early-thunderstorm season lightening-caused fires will have the maximum effect on seedlings and young shrubs while favoring quality perennial forage grasses over forbs. All that said, please remember that whatever prescription is used to achieve your objective, remember to do it safely.