Kansas. However, research behind these recommendations has been extended beyond its underlying scientific basis and the results have not been found to be repeatablet. The Kansas recommendations were based on research taken from only two replicates of ungrazed small plots (the historical Aldous plots). Other data used for these recommendations were collected from inside cages that were ungrazed and not replicated. These studies did not validate the recommendation that burning should only be done in late spring for the best cattle production. In fact, other studies on season of fire on tallgrass prairie have demonstrated that forage production varies from year to year, based on weather and is not predictable by following calendar dates or the phenology of plants for timing of fire. For more information see NREM-2877, *Fire Effects in Native Plant Communities* (http://factsheets.okstate.edu/documents/nrem-2877-fire-effects-in-native-plant-communities/).

Tallgrass prairie response to fire is highly variable due to the amount and distribution of precipitation, air temperature, soil type, previous history of grazing and fire, presence of invasive plants and current management. Other concerns related to Kansas recommendations pertain to the diversity of prairie plants and wildlife. For example, research has shown that burning large tracts of land in late spring is detrimental to plant diversity and can cause problems for ground nesting birds, such as the Greater Prairie Chicken, Bobwhite Quail and other prairie birds.

Contemporary Research and Recommendations

Research has shown that varying the season of burn will benefit livestock and wildlife, as well as help control native invasive species, such as eastern redcedar. Recent research has shown that fire applied in patches during both the growing and dormant seasons, when combined with cattle grazing, will slow the spread of sericea lespedeza, a non-native and invasive noxious weed. Varying burn seasons can cause swings in species composition based on whether the plants are cool- (C3) or warm-season (C4) grasses or forbs (herbaceous plants with broad leaves). Grasses and forbs can be perennials (grasses and forbs that live for more than two years), biennials (forbs that live for two years) or annuals (grasses and forbs that grow from seed each year). Cool-season perennial grasses are more susceptible to burning during the late winter and early spring. If management objectives are to increase cool-season grasses, then burning in seasons other than late winter/early spring will yield the best results. For example, burning in September is optimal, because it is just before cool season grasses begin their growth period. Warm-season perennial grasses are actively growing in late spring through the summer, so these grasses are generally benefited by a winter or spring burn. However, both cool- and warm-season grasses are adapted to fire at any time of the year. Annual grasses and forbs are usually killed if burned after they germinate. For a detailed discussion of fire effects on plants see NREM-2877, *Fire Effects in Native Plant Communities* (http://factsheets.okstate.edu/documents/nrem-2877-fire-effects-in-native-plant-communities/).

The most important point to remember is that native plant communities have developed with periodic fire through thousands of years. Native prairies, shrublands and forests are resilient to fire and other disturbances in all seasons and conditions.

Other Suggested References

NREM-2885, Best Time of Year to Conduct Prescribed Burns
NREM-2893, Burn Plan for Prescribed Burning
E-927, Using Prescribed Fire in Oklahoma
E-998, Patch Burning: Integrating Fire and Grazing to Promote Heterogeneity
E-1010, Oklahoma Prescribed Burning Handbook
E-1025, Burning in the Growing Season
OK-FIRE wildland fire management system (https://www.mesonet.org/index.php/okfire)
Fire Prescription Planner on OK-FIRE (https://www.mesonet.org/index.php/okfire/fire_rx)

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Fire Prescriptions for Restoration and Maintenance of Native Plant Communities

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Introduction

Four conditions are necessary for fire to assume ecological importance: 1) an accumulation of organic matter, i.e. fuel either herbaceous or woody, sufficient enough to burn; 2) dry weather conditions to render the material combustible; 3) a landscape conducive to the spread of fire; and 4) a source of ignition. The only two important sources of ignition are humans and lightning. Historically, Native Americans had a much greater role in establishing fire on the landscape than did lightning.

The purpose of using prescribed fire (controlled fire) is to reestablish one of the three key ecosystem drivers on the landscape. The other two drivers are herbivory (of which we have control) and climate (no control). One goal of all management plans should be to restore ecosystem processes such as photosynthesis and decomposition. These processes facilitate energy flow, nutrient cycling, water cycling and other processes. Research has shown that there is no substitute for fire in restoring ecosystems.

A fire prescription is a set of conditions under which a prescribed fire will be set to meet land management objectives. It is based on scientific research and experience. The purpose of this fact sheet is to provide recommendations for developing fire prescriptions. Specific recommendations must be customized for the particular piece of land in question. There are many possible fire prescriptions and vegetation responses.

Many factors affect vegetation response (i.e. habitat) after a prescribed fire or wildfire. These include weather, stage of plant succession, fuel load, topography, soil type and previous management. To select a starting point for fire prescription development, select the dominant native vegetation type on the land in question (e.g. tallgrass prairie, oak-pine forest, etc.). There are 15 major native vegetation types in Oklahoma, based on the Duck and Fletcher survey map of 1943. This and other useful information can be found in E-993, *Oklahoma's Native Vegetation Types* (http://factsheets.okstate.edu/documents/e-993-oklahomas-native-vegetation-types/) or in *Field Guide to Oklahoma Plants* available on the NREM marketplace (http://nrem.okstate.edu/alumni-and-friends/nrem-marketplace). Another essential reference for establishing vegetation management goals is the *Ecological Site Description* (ESD) application available from the Natural Resources Conservation Service (NRCS) website (https://esis.sc.egov.usda.gov/Default.aspx). An ESD lists the plant communities and other characteristics relevant to the site.

Fire Prescriptions

The most frequently asked question is "Under what conditions should I burn?" First, determine the management goals and objectives. Then develop a fire prescription based on the unit of land in question. A range of prescription variables have been used successfully in Oklahoma and surrounding states for different objectives (Table 1). Prescribed burns can be classified as either restoration or maintenance burns, with each possibly requiring different personnel, tactics, training, equipment and firebreaks. A restoration burn is typically one that is conducted to restore or reclaim an area after a long absence of fire. The execution of some restoration burns requires more preparation and inherently involves more risk (Table 2). Maintenance burns are conducted after a unit has reached the desired management goals and fire is needed to maintain it. These burns are normally easier to conduct. A consultation with a fire management specialist to develop a customized fire prescription that will meet your objectives is suggested.

Table 1. Potential fire prescription variation for conducting a prescribed fire.

Prescription Variable	*Range*
Temperature	30 to 110 F
Relative Humidity	10 to 80%
Wind Speed	4* to 25 mph
Season of Burn	Winter, Spring, Summer or Fall

*Note: Caution! Light winds are usually variable in direction; during inversion conditions (e.g., nighttime with clear skies) air near ground level will tend to flow toward areas of lower elevation (gravitational drainage flow).

General Guidelines

Rule 1. For those with limited burn experience or wanting to reduce spotfire risk, use the 60:40 Rule. The 60:40 rule can be applied in one of two ways: 1) conduct burns when the air temperature is less than 60 F and relative humidity is greater than 40 percent or 2) burn when the temperature (F) and relative humidity (%) are between 60 and 40.

Rule 2. When concerned about weather conditions changing during the day or possibly burning outside of the prescription, use the **Rule of Halves** (Figure 1). This rule is used in the field to predict changes in relative humidity, which will change fire behavior. The Rule of Halves states that when the air temperature increases by 20 F, relative humidity decreases by around 50 percent. For example, if the air temperature in the morning is 60 F with 40 percent humidity and the afternoon high temperature is forecast to be 80 F, the relative humidity will be around 20 percent. A fire that can be conducted safely at 40 percent relative humidity may pose a safety risk at 20 percent. This also works inversely: as the temperature decreases by 20 F, relative humidity will approximately double.

Rule 3. In most cases, do not burn if there is a forecasted frontal passage or wind shift, such as a dryline, within 12 hours of the planned burn (Figure 2).

Rule 4. In general, the width of firebreak on the downwind side of the area to be burned should be 10 times the height of flammable vegetation. Firebreaks are usually a combination of bare ground, mowed strips and backfired strips. If the firebreak is insufficient, you may experience a fire escape.

Rule 5. If conditions are not right, including all parts of the prescription (adequate personnel, equipment, weather conditions, etc.), do not start the fire. Wait until everything is right.

Rule 6. If the fire is not going well, put it out, if possible. Difficulties could be due to spotfires , creep-overs, equipment problems, extreme fire behavior, utilizing too much water or resources stretched too thin.

Rule 7. Do not leave the fire until it is completely out and the edges have been mopped up properly, with no smoke or embers for at least one hour along the edges of the burn unit.

For purposes of fire prescription and fire behavior, it is important to understand wind information. Wind speeds

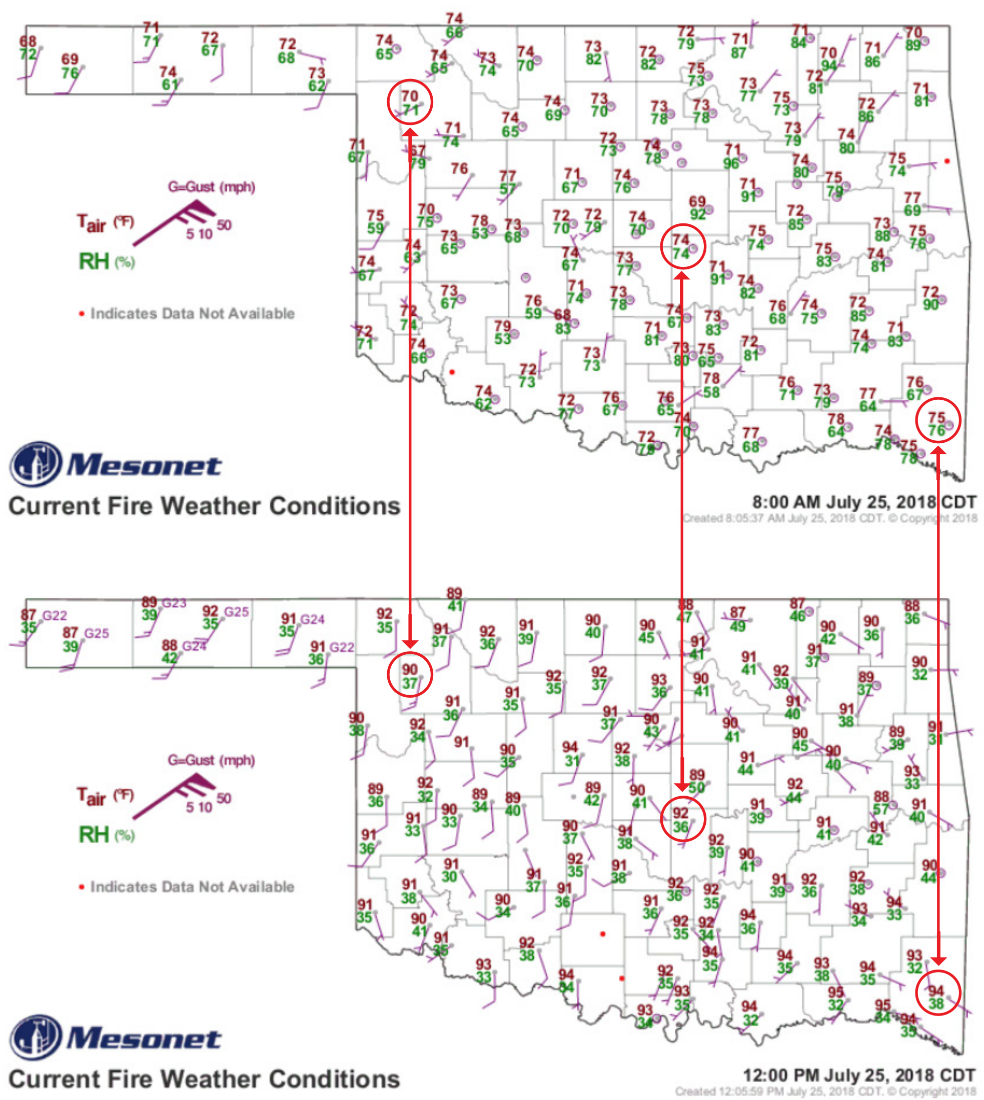

Figure 1. The Rule of Halves states that when the air temperature increases by 20 F, relative humidity (in green) decreases by around 50 percent.

OK-FIRE Fire Prescription Planner

Latest forecast based on 1 pm CDT 07/23/18 NAM; NEXT 6-hr update expected 11 pm CDT 07/23/18

Fire Prescription Table for Vinita Print Table

Disclaimer: *This forecast table, as with other OK-FIRE products, is based solely on output from the latest 84-h NAM forecast. As no weather forecast model is perfect, users are encouraged to check the official forecasts of the National Weather Service for consistency or discrepancies in the weather variable portion of this forecast.*

Change Prescription or Site

DATE / TIME	Criteria Met?	TAIR	RELH	WDIR	WSPD	1hr PRECIP	DISPERSION	1hr DFM	10hr DFM
Mon 7/23/18 10 pm CDT	No	74°F	81%	NNE	6 mph	0.00 in.	1 (VP)	11%	9%
Mon 7/23/18 11 pm CDT	No	72°F	84%	NNE	6 mph	0.00 in.	1 (VP)	13%	11%
Tue 7/24/18 12 am CDT	No	71°F	87%	NNE	5 mph	0.00 in.	1 (VP)	15%	12%
Tue 7/24/18 1 am CDT	No	70°F	90%	NNE	5 mph	0.00 in.	1 (VP)	16%	14%
Tue 7/24/18 2 am CDT	No	69°F	89%	N	4 mph	0.00 in.	1 (VP)	18%	14%
Tue 7/24/18 3 am CDT	No	69°F	89%	N	4 mph	0.00 in.	1 (VP)	19%	15%
Tue 7/24/18 4 am CDT	No	69°F	89%	NNW	4 mph	0.00 in.	1 (VP)	19%	15%
Tue 7/24/18 5 am CDT	No	69°F	89%	NNW	4 mph	0.00 in.	1 (VP)	19%	15%
Tue 7/24/18 6 am CDT	No	69°F	89%	NNW	4 mph	0.00 in.	1 (VP)	19%	16%
Tue 7/24/18 7 am CDT	No	69°F	90%	NNW	4 mph	0.00 in.	2 (P)	19%	16%
Tue 7/24/18 8 am CDT	Yes	74°F	79%	NNW	5 mph	0.00 in.	4 (MG)	16%	16%
Tue 7/24/18 9 am CDT	Yes	79°F	69%	NNW	6 mph	0.00 in.	4 (MG)	14%	16%
Tue 7/24/18 10 am CDT	Yes	84°F	59%	N	7 mph	0.00 in.	5 (G)	11%	15%
Tue 7/24/18 11 am CDT	Yes	87°F	55%	N	8 mph	0.00 in.	6 (EX)	9%	14%
Tue 7/24/18 12 pm CDT	Yes	89°F	50%	N	9 mph	0.00 in.	6 (EX)	8%	13%
Tue 7/24/18 1 pm CDT	Yes	91°F	46%	N	10 mph	0.00 in.	6 (EX)	7%	11%
Tue 7/24/18 2 pm CDT	No	91°F	44%	N	10 mph	0.00 in.	6 (EX)	6%	10%
Tue 7/24/18 3 pm CDT	No	92°F	43%	N	10 mph	0.00 in.	6 (EX)	6%	9%
Tue 7/24/18 4 pm CDT	No	92°F	42%	N	10 mph	0.00 in.	6 (EX)	6%	9%

Figure 5. Example of resulting forecast table for Vinita in the Fire Prescription Planner on OK-FIRE. Using the entered prescription, the table indicates a burn window from 8 a.m. to 1 p.m. the next day (green shaded cells in criteria column).

Photo courtesy J. Weir

It is important to know how woody plants respond after fire. Most woody plants, like this smooth sumac resprout, but a few like eastern redcedar will not resprout if the top growth is killed.

not resprout if the top growth is killed. A woody plant's tolerance to fire depends on many factors, and species-specific information should be obtained as part of the fire prescription process. A good rule of thumb is that the thicker the bark, the more resistant the species is to fire. The most important element in woody plant response is fire frequency, not the time of year (season). In general, fires with a frequency of three years or less will cause resprouting woody plants to decline and decrease in height. Fires with a frequency of four years or longer will allow woody plants to increase in canopy cover and height.

Herbaceous Plant Response to Fire Frequency and Fire Season

Historical Overview

For many years, recommendations for burning tallgrass prairie have been very specific and time sensitive to a calendar date and season, based on research studies in northern

3). For purposes of determining dead fuel moisture, woody fuel samples are taken from standing dead trees or shrubs and must be off of the ground. Moisture in woody fuel samples is measured in the field by a protimeter moisture meter or weighed in the field and then dried in an oven and weighed again. Herbaceous fuel is weighed in the same manner and must be standing erect. The categories for time lag fuels are listed in Table 3.

How to figure fuel moisture (live or dead fuels):
% Fuel Moisture = 100 X (Wet Weight – Dry Weight) ÷ (Dry Weight)

Table 3. Time-Lag Categories for Dead Fuels.

Fuel Size (inches in diameter)		*Time Lag (hours)*
0-0.25	herbaceous or woody	1
0.25-1.0	woody	10
1.0-3.0	woody	100
>3.0	woody	1,000

OK-FIRE calculates actual 1-; 10-; 100- and 1,000-hour dead fuel moisture every hour, as well as the forecast values for the next 84 hours. This information is available in map, chart and table formats and is valid for fuels in unshaded locations.

The threshold moisture at which fine fuels (1-hour time lag) will or will not burn in sunlight is 30 to 40 percent. Below 20 percent, fine fuel moisture has relatively little effect on prescription objectives in comparison to wind speed. The preferred range of 1-hour fine fuel moisture for prescribed fire is from 7 to 20 percent. Other 1-hour fine fuel moisture thresholds are 5 percent, 7 to 8 percent, and 11 percent. Below 5 percent fine fuel moisture (relative humidity less than 20 percent), spotfires are certain, whereas spotfires are rare when fine fuel moisture is above 11 percent (relative humidity above 65 percent). Fine fuel moisture of 7 to 8 percent corresponds to a relative humidity of 40 percent, which is the minimum relative humidity at which firebrands usually cease to be a problem in dry grass.

Photo courtesy J. Weir

Fuel sticks in the field representing the four time-lag sizes. 1-hour dead fuels are on the extreme left (0.125" diameter); 10-hour are in the back left area (0.5" diameter); 100-hr are in the center front (1.5" diameter); and 1,000-hour are on the right (5" diameter).

Following a rain, fine fuels, such as dead grass, can quickly dry out and equilibrate to changing weather conditions. Such fuels can readily burn an hour or so after rain if weather conditions are suitable. However, small dead woody limbs 2 inches in diameter (100-hour fuels) will require days to weeks at a constant relative humidity and temperature to reach equilibrium, and logs (1,000-hour time lag fuel) will require weeks to months. During the hot, dry summer of 2011, 1,000-hour fuel moisture fell to under 4 percent by August in the Wichita Mountains, setting the stage for the multi-week 40,000 acre Ferguson fire in early September.

Prescribed fire will spread well when 10-hour time lag fuel moisture is between 6 and 15 percent. This fuel size will burn rapidly at 6 percent fuel moisture, but may not burn above 15 percent in certain fuel types. Fuel moisture both in and adjacent to a prescribed fire is important for both meeting objectives and safety. If fuel moisture exceeds 30 to 40 percent in duff or fine fuels (grass) or 15 percent in 10-hour time lag fuels, there is minimal danger from firebrands moving downwind to start a spotfire.

Smoke Management

Burning on days that have good smoke dispersion can reduce adverse smoke effects. Before beginning a prescribed fire, the effects of smoke downwind must be considered. Burning so smoke disperses away from sensitive areas (residential areas, hospitals, highways and airports) must be considered in the planning process. Burning should be conducted according to smoke management guidelines and regulations. Burning during times of high air pollution should be avoided and burning during the nighttime should be done with caution. Temperature inversions can trap smoke near the ground and cause serious visibility problems. Completing prescribed fire early in the day reduces the amount of smoke that may be trapped in a nighttime thermal inversion. If smoke is a problem, consider burning smaller units or backfiring. If a unit has not been burned for many years, relatively more smoke will be produced the first time it is burned. Research has shown that wildfires contribute much more air pollution than prescribed fires. For more information see E-1008, *Smoke Management for Prescribed Burning* (http://factsheets.okstate.edu/documents/e-1008-smoke-management-for-prescribed-burning-pdf-only/).

Current and 84-hour forecast smoke dispersion conditions are available on OK-FIRE (https://www.mesonet.org/index.php/okfire) in map, chart and table formats to aid in smoke management. OK-FIRE also has a Fire Prescription Planner (Figure 5). You can enter the prescription, run it for any Mesonet site and get an hourly table for the next 84 hours, which will indicate time periods when all your prescription criteria will be met, providing possible windows to conduct the burn.

Woody Plant Response to Fire Frequency and Fire Season

For better control of woody plants, burning toward the end of the growing season has shown the best results. It is important to know how woody plants respond after fire. Most woody plants resprout, but a few like eastern redcedar will

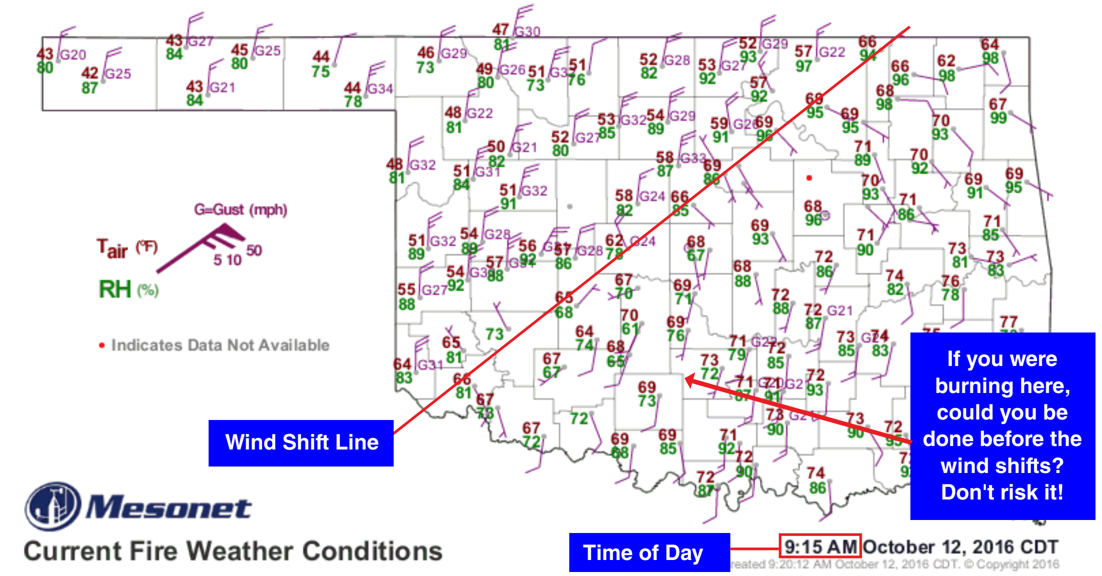

Figure 2. Do not burn within 12 hours of a predicted wind shift or frontal passage. In the example above, a strong cold front is crossing the state with an abrupt shift in wind directions.

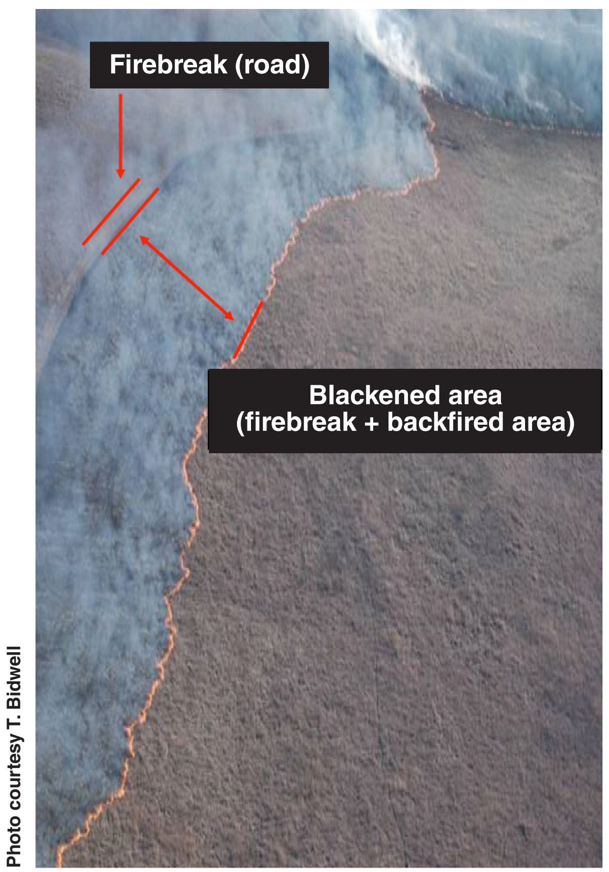

Photo courtesy T. Bidwell

Firebreaks are usually a combination of bare ground, mowed strips and backfired strips.

Photo courtesy K. Davis

Do not leave the fire until it is completely out and the edges have been mopped up properly, with no smoke or embers for at least one hour along the edges of the burn unit.

and directions can be reported and measured at a variety of heights, with the standard height is typically 10 meters (33 feet). At the 120 Oklahoma Mesonet locations across the state, current and forecast average wind speeds and directions are measured and predicted at the 10-meter height. Wind gusts also are measured at the 10-meter level. Current average wind speeds at the 2-meter (6.5-foot) height are also available for most of the Mesonet locations. This information can be found on the OK-FIRE wildland fire management system (https://www.mesonet.org/index.php/okfire). The reported 10-meter average wind speeds are often greater than wind speeds recorded on site at ground level. The following guidelines can help estimate the reduction in wind speed from 10 meters to ground level. If possible, always take on-site measurements using a hand-held anemometer (then no wind speed reduction is needed).

To reduce 10-meter wind speeds to ground level:

1. In open grassy areas, reduce the wind speed by 50 percent (multiply speed by 0.5)
2. In shrub/brush areas, reduce the wind speed by 60 percent (multiply speed by 0.4)
3. In forest understories, reduce the wind speed by 70 percent (multiply speed by 0.3)

Table 2. Fire Prescription Interactions for Restoration and Maintenance.

Objective and Prescription Variable ↓	Degraded Phase	Restoration Phase	Maintenance Phase
		Manipulative intervention	Periodic fire required, as well as, other normal ecological processes
Escape Risk	High	Moderate	Low
Complexity of Burn	High	High to Moderate	Low
Wildlife Habitat Water Quality/Quantity Livestock Habitat	Poor	Poor to Moderate	Good
Forest	• Overstory of Cedar	• Midstory Cedar	• Understory or No Cedar
Fire Type*	• Fire type D or wildfire	• Fire type C, F, G	• Fire type A, B, C, E
Fuel Type/Flammability	• Cedar/Volatile	• Cedar, leaf litter/Volatile	• Leaf litter/Non-Volatile
Weather Conditions	• High temp & winds, Low RH	• High temp & winds, Low RH	• Low temp & winds, High RH
Prairie & Shrublands	• Cedars > 20' tall • > 250 trees/acre	• Cedars 6' to 20' tall • 250 trees/acre	• No Cedar/Cedar < 6' tall • < 250 trees/acre
Fire Type*	• Fire type D or wildfire	• Fire type C, F, G	• Fire type A, B, C, E
Fuel Type/Flammability	• Cedar/Volatile	• Cedar, grass, shrub/Volatile	• Grass, shrub/Non-Volatile
Weather Conditions	• High temp & winds, Low RH	• High temp & winds, Low RH	• Low temp & winds, High RH
Riparian Zone Habitats	• Cedars > 20' tall • > 250 trees/acre	• Cedars 6' to 20' tall • 250 trees/acre	• No Cedar/Cedar < 6' tall • < 250 trees/acre
Fire Type*	• None	• None	• Fire type A, B
Fuel Type/Flammability	• Cedar/Volatile grass/Volatile	• Cedar, leaf litter, Non-Volatile	• Grass, leaf litter/
Weather Conditions	• None without loss of habitat	• None without loss of habitat	• Low temp & winds, High RH

* Fire types from Eastern Redcedar Control and Management-BMP to Restore Oklahoma's Ecosystems NREM-2876

Special Considerations

Brush Piles

Trees and brush should not be cut, dozed and piled prior to a prescribed burn. This will only complicate the burn and increase spotfire or escaped fire chances. Research has shown that brush piles can cause spotfires up to 500 feet downwind. Removal of trees along the boundary of the burn unit may be necessary to make the burn safer and easier to conduct. If so, make sure to push the trees a minimum of 300 feet into the burn unit, keeping piles small or using a mulcher to eliminate the need to pile altogether.

There are also some economic benefits to not cutting down trees until after the prescribed burn. If you burn first, the fire should kill many of the cedars, depending upon height and fuel load. Then you can let a cedar cutter cut only the trees that did not crown or brownout. This will reduce time and cost for cedar control.

The best time to burn brush piles is after the prescribed fire. Burn while the area is black or after the grass has greened up. We have found that the safest time to burn brush piles is May and June. During this time most grass is green and will burn slowly, making suppression safer and easier. Care should be exercised when burning brush piles in or near areas that are ungrazed or lightly grazed. Have suppression equipment available on site anytime you burn. For more information on burning piles, see NREM-2894, *Managing Brush Piles* (http://factsheets.okstate.edu/documents/nrem-2894-managing-brush-piles/).

Safety Concerns

Burns conducted with higher temperatures and lower humidity in the dormant season should be reserved for more experienced fire bosses and crews. The following figures (Figures 3 and 4) show the results of 99 burns conducted by an experienced OSU burn crew between 1996 and 2002. Notice that spotfires do occur under certain conditions. The concern is how large the spotfire gets before it can be stopped. This will depend upon fuel load, wind speed, crew size, crew experience, dependability of equipment and how soon the spotfire is discovered. Figure 3 shows that only two spotfires occurred out of 53 fires conducted with humidity over 40 percent (60:40 rule). Nineteen spotfires occurred out of 46 fires conducted with humidity less than 40 percent. This demonstrates a definite threshold for spotfire occurrence. Spotfires are only a problem if you are unprepared to stop them. There is no evidence that burning under normal prescriptions pose any danger for starting a wildfire that cannot be controlled. "Normal" fire prescriptions are not conducive to wildfire.

If a prescribed fire is conducted with relative humidity under 25 percent, it is a 100 percent certain a spotfire will occur. There is only a 46 percent chance of a spotfire when the humidity is between 25 and 29 percent (Figure 4). This data does not mean burning with humidity under 40 percent is unwarranted, but suggests that this is one many decisions to be made when planning a prescribed burn. There are areas in western Oklahoma that will not burn when the humidity is over 40 percent, but there are also areas that can be burned safely and easier with humidity over 40 percent. Figure 4 also shows that burning when relative humidity is less than 40 percent increases spotfire risk and should be practiced only by those with experience. Before lighting a fire, ask yourself, "Can I control this fire if it escapes with the equipment and crew on site?"

One factor that can increase the safety margin is adequate or heavy fine fuel loads. This will allow burns with high humidity, making it safer. The heavy fuel loads will allow you to accomplish the same objectives, e.g. scorching woody plants, as burning with low relative humidity and light fine fuel loads. For more information see NREM-2903, *Prescribed Burning: Spotfires and Escapes* (http://factsheets.okstate.edu/documents/nrem-2903-prescribed-burning-spotfires-and-escapes/).

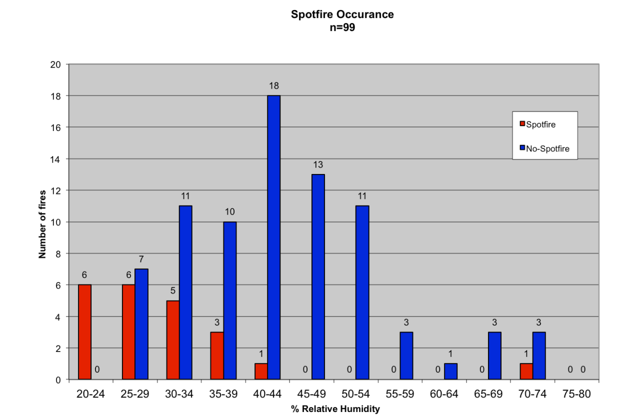

Figure 3. Spotfires can occur at any time, but the majority happen when relative humidity is below 40 percent.

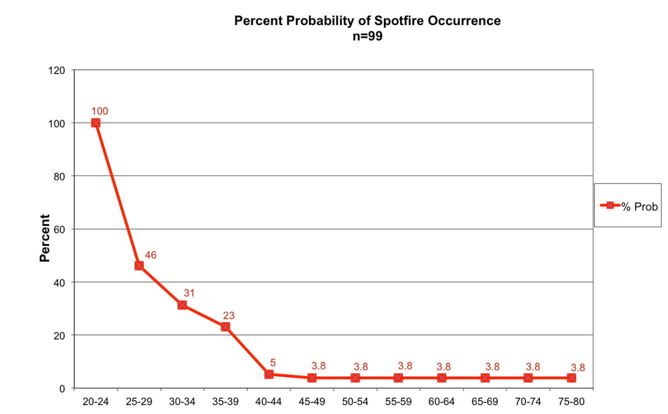

Figure 4. Probability of spotfire occurrence increases below 40 percent relative humidity.

Fuels and Fuel Moisture

Another safety consideration and potential objective is the role of herbaceous and woody fuels in a fire and how to assess their potential for combustion. Woody and herbaceous fuels can be classified as dead or live. Live fuels are actively growing plants and will typically exceed 100 percent moisture on a dry weight basis. Most live fuels are normally not as good predictors of combustion or flammability as dead or dormant fuels. Such fuels are classified by the diameter of the fuel and defined by the time lag necessary for that size fuel to lose approximately 63 percent of the difference between its initial moisture content and its equilibrium moisture content (Table