Natural Resources Conservation Service
GUIDANCE DOCUMENT
Prescribed Burning (338)
Nebraska

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A. Specifications for Prescribed Burning

The burned area must be incorporated into a system of management, allowing for prescribed fire conditions and subsequent response of the desired plant community. Refer to the following conservation practice standards for suited application(s) for meeting the primary resource objectives:

Primary Objective	Management System
Plant production, health, vigor on grazed lands	Prescribed Grazing (528)
Habitat maintenance or enhancement	Upland Wildlife Habitat Management (645)
	Wetland Wildlife Habitat Management (644)
	Early Successional Habitat Development/Management (647)
Invasive plant treatment	Brush Management (314)
	Pest Management (595)
	Forest Stand Improvement (666)

The prescribed burn plan will be prepared using Prescribed Burn Implementation Requirements (NE-ECS-72) or other format that contains the following required criteria:

- Location & Description of Burn Area
- Resource Management Objectives
- Pre-burn Vegetation Cover & Estimated Fuel Load
- Pre-burn Preparation Requirements
- Firebreak/Fuel Break Design & Specifications
- Hazards
- Access To the Burn Unit & Adjacent Land
- Adjacent Land Characteristics
- Notification Checklist (Neighbors, Safety Personnel, Other Agencies)
- Planned Date Range for Burn (Time of Year and/or Vegetative Growth Stage)
- Weather Parameters
- Basic Smoke Management Practices
- Firing Sequence/Ignition Method
- Contingency Plans (Fire Escape & Wind Change Response)
- Mop-up Plan
- Resource Maps
    - Burn Plan Map
    - 2-Mile Map
    - Topo or Hillshade Map (Optional)
    - Supplemental Maps (Optional)
- Equipment Checklist, Personnel Assignments, and Need/Safety Requirements
- Post-burn Evaluation Criteria
- Approval Signatures

Refer to Nebraska's Policy and Instruction Supplements to Title 190, General Manual, Part 413, for policy and procedures regarding NE NRCS employee involvement with prescribed burning.

B. Prescribed Burning Classifications and Fuel Definitions

Class	Criteria
Class 1	Individual must complete 16 hours of awareness training to discuss prescribed burning (338) and burned firebreak (394) as an alternative practice in a conservation planning process.
Class 2	Size of area: <= 100 ac. Vegetation: non-volatile fuels Terrain: <= 15% slope
Class 3	Size of area: >100 acres* Vegetation: non-volatile & restricted volatile fuels Terrain: <= 25% slope
Class 4	Size of area: >100 acres* Vegetation: volatile & non-volatile fuels Terrain: <= 25% slope
Class 5	Size of area: no restrictions* Vegetation: no restrictions Terrain: no restrictions

**Notify the State Resource Conservationist for approval of prescribed burn plans exceeding 3,000 acres.*

Non-volatile herbaceous fuel: Herbaceous fuels that contain low amounts of volatile oils, do not typically burn with increased fire behavior, or create firebrand issues as compared to volatile herbaceous fuels.

Volatile herbaceous fuel: Herbaceous fuels that either contain higher amounts of volatile oils, burn with increased fire behavior, or create firebrand issues.

Non-volatile woody fuel**:** Trees and shrubs that either contain low amounts of volatile oils, do not typically burn with increased fire behavior, or create firebrand issues as compared to volatile woody fuels.

Volatile woody fuel: Woody fuels that either contain higher amounts of volatile oils, burn with increased fire behavior, or create firebrand issues. Red slash is considered a volatile fuel.

Restricted volatile fuel: Includes volatile woody species criteria but height is less than 4' tall.

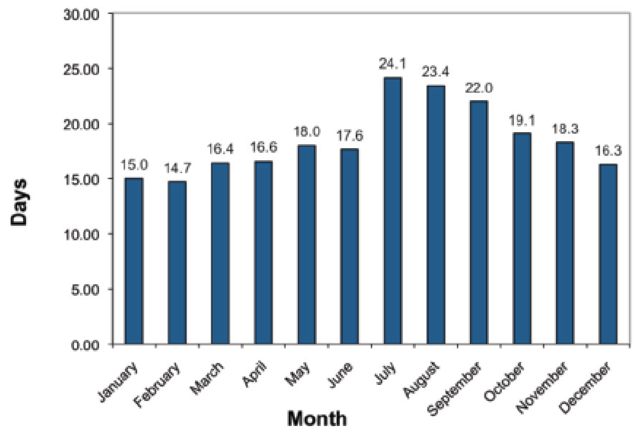
C. Objectives

Every burn must have a defined objective. Consideration will be given to whether one is managing for a warm or cool season perennial grass system and the specific objective of the burn within that system.

Refer to Tables 2 (Page 13) and 3 (page 14) for objectives, corresponding burn considerations, and general recommendations for fire frequencies in warm and cool season systems. Site specific conditions should influence fire frequency interval to manage the desired plant communities.

D. Season of Prescribed Burning

Traditionally, prescribed burning of rangelands in Nebraska has been in the spring dormant season, primarily the months of March through April. Consider growing season burns if the objectives, program regulations, and management system allow. The growing season offers more days with weather conditions containing safer burn parameters, ultimately making more days available for burning within the growing season and overall, across a year. Recent mild weather patterns during the fall/winter have provided more available burn days that could be taken advantage of. The opportunity to spread grassland burning across a greater number of days and seasons reduces the number of burns pressured into days with unsafe or marginally safe conditions in the spring and reduces the number of burns having to be postponed to the following year. Spreading burns out temporally through all seasons (spring, summer, fall, winter) also reduces atmospheric smoke concentrations in the traditional burn months of March and April.



The average number of burn days per month using the following weather parameters: temperature between 30 F to 110 F, relative humidity of 25 to 80 percent, wind speeds at 4 to 15 mph, no precipitation during the time period, and there must be a minimum of a three-hour consecutive block of these conditions for that day to be considered a burn day.

The above graph is sourced from Oklahoma State University and data is derived near Stillwater, OK. Nebraska trends will differ, but the example provides context towards opportunities to expand the burn window.

Residual herbaceous growth from years prior provides the fuel to carry fire through green vegetation and is key to increasing the success of a growing season burn. Research shows that growing season fires have greater success in reducing woody and promoting herbaceous plant cover diversity, seed production, and vigor.

Due to the presence of moisture in green vegetation, growing season fires tend to be easier to control, despite heavy and/or volatile fuels. Generally, the rate of fire spread is slower, and the probability of spot fire ignition is lower in growing season fires as compared to dormant season burning.

Smoke increase due to moisture in green vegetation is a factor in growing season burns and should be a planning consideration.

For more information reference The Best Time of Year to Conduct Prescribed Burns, Burning in the Growing Season, and Oklahoma Prescribed Burning Handbook.

E. Firebreaks/Burn Unit Design

Clients are responsible for confining prescribed burns to the intended area defined in the burn plan.

Firebreak type and dimension are determined largely by the fuel load, fuel type, topography, intended weather, and capability of the crew. Planning firebreaks strictly along property lines may not always be feasible. The involvement of adjacent landowners may be necessary to take advantage of natural or existing features or allow construction of a new firebreak in a safer and/or more feasible location.

Plan firebreaks to protect sensitive wildlife habitat, headquarters, oil and gas sites, windbreaks, tree and shrub plantings, highly erodible areas, archeological and cultural sites, ranch infrastructure (such as corrals), pumping plants, and other areas that would be unsafe or undesirable to burn.

Dimensions and types of firebreaks will be designed for each burn and recorded in the prescribed burn plan. Fuel loading influences flame length, which directly dictates firebreak width. Regarding herbaceous fuel, the effective width should be approximately ten times the height of the vegetation being burned. Once an ignited fire line reaches unmown, standing fuel, the fire intensity and heat will significantly increase. A firebreak of appropriate width will allow crews to withstand the heat and maintain their position.

Strategically plan conservation practices to facilitate the prescribed burn. A commonly overlooked factor is fuels management prior to the prescribed burn. Consider implementing specific designs and specifications within the brush management and/or fuel breaks plan to ensure heavy and/or volatile fuels are being treated and relocated at appropriate distances from the planned firebreak during the initial treatment. Doing this greatly reduces future burn unit preparation and mop-up requirements.

For more information reference "Nebraska Firebreak Guidance Document."

F. Weather

Knowledge of weather is important for safe and successful prescribed burning and smoke management. Weather forecasts should be monitored several days prior to burning. A 24-hour hourly weather forecast predicting fire weather parameters should be obtained prior to doing a prescribed burn and should be printed the morning of the burn and taken to the burn site prior to ignition. Hourly weather forecasts are available from the local National Weather Service website. If the burn unit contains long duration fuels (trees, woody debris, cow chips, etc.), then post-burn weather forecasts for at least two days or longer depending on site characteristics should also be considered prior to ignition.

Onsite weather should be monitored and recorded just prior to ignition, every 30-60 minutes during the burn or as necessary, and at mop-up. Parameters to monitor and record include temperature, relative humidity, wind speed, and direction and other pertinent notes related to noticeable differences in anticipated fire behavior.

Burning is not recommended within 12 hours of a predicted wind shift or frontal passage. Due to long burn durations of heavy fuels, it is not recommended to burn areas with heavy fuel if a wind shift, strong winds, or a gust front is forecasted within a two-day period following a prescribed burn.

NRCS Acceptable Weather Parameters Include:

- Wind Speed: 5 - 20 mph
- Relative Humidity ≥ 20%
- Air Temperature ≤ 100°F

Burning is generally not recommended and can be extremely risky when one or more of the following conditions exist:

- Air temperature exceeds 80°F for dormant season burns and 100°F for growing season burns.
- Wind velocity (including gusts) > 20 mph.
- Variable or no-wind
- Relative humidity < 20%.

Although some objectives may be carried out with these extreme conditions, a great amount of consideration, preparation, and crew experience is necessary. Burn objective(s) will dictate the use of either a dormant season or growing season burn. For general weather parameters applicable to each season, see Table 1 below.

Table 1. Seasonal Criteria for Burning

	Dormant Season	Growing Season
Warm Season Window	October 1 – May 14	May 15 – September 30
Cool Season Window	December 1 – March 14 July 1 – August 31	March 15 – June 30 September 1 – November 30
Wind Velocity	5–20 mph	5–20 mph
Relative Humidity	20–70%	20–80%
Air Temperature	32–80° F	60–100° F

DO NOT use the extreme ends of the above ranges in conjunction with each other. For example, it is not recommended to conduct a dormant season burn with 20 mph wind, 20% relative humidity, and 80° F air temperature.

Fuel Moisture: For a growing season fire, do not use condition extremes, particularly low humidity when moisture content of growing vegetation is low and/or green vegetation makes up a low proportion of the standing biomass.

G. Smoke Management

Smoke considerations should be addressed in the burn plan. This should include measures to avoid smoke impacting sensitive areas, reduce overall smoke, and/or dilute smoke in the atmosphere. Consider developing a smoke trajectory map to depict the anticipated trajectory of the smoke plume. For downwind smoke mapping, assume smoke will spread horizontally 30° from the outside edge of the burn unit on each side. The primary area of concern exists inside that 60°+ arc downwind within three (3) times the width of the burn unit. Online smoke trajectories can be accessed using the Simple Smoke Screening Tool.

Avoidance should be the primary tactic to prevent smoke from impacting local sensitive areas. Nearby roadways, airports, residences, municipalities, health care facilities, schools, and other areas where smoke may pose a health and/or safety risk to human life are considered sensitive areas. These will be identified, and if possible, wind direction should be planned to avoid impacting them with immediate smoke projection.

Smoke is a liability factor of burning. It is critical not to project smoke in such a manner that it creates an airport safety hazard or a traffic safety hazard on a public roadway. In some cases, traffic hazards due to low visibility may be mitigated by involvement of law enforcement authorities and dedicated traffic control personnel.

Reduction of smoke should also be a burn planning consideration. Low intensity burning will minimize carbon release. Backfiring tends to burn fuel more efficiently than flank or head fires and thus, produces less smoke. Another technique in smoke reduction (at any given time) is to reduce the area burned at the same time. This can be done temporally by rotating burn units across several years, such as that done in a patch burn grazing system. It can also be done spatially in the same year by burning a unit in strips rather than all at once. Strip firing will also reduce the overall fire intensity in burning the unit.

Burning at reasonable intervals, see Tables 2 and 3 (page 13), will prevent extreme fuel loading and thus reduce smoke when a burn does occur. Consider planning prescribed burns for the growing season when it has not previously been tradition to burn in Nebraska.

Dilution of smoke reduces smoke concentrations by mixing it with a greater volume of air. This is of particular importance when considering smoke impacts of more distant areas that could potentially be affected. Mixing height and transport wind greatly affect how well smoke dilutes in the atmosphere and is dispersed over long distances. Mixing height is the height above the surface throughout which smoke will mix and subsequently disperse. Atmospheric stability affects vertical motion and mixing height. An unstable atmosphere (clear skies and cumulus clouds) increases mixing height. A stable atmosphere (overcast skies and stratus clouds) decreases mixing height. Therefore, the atmosphere needs to be somewhat unstable for good smoke rise and mixing, but not so unstable that it creates an unsafe situation for the crew managing the burn on the ground. A mixing height of 1,800’ or greater is recommended. Transport wind is the average wind (speed and direction) throughout the depth of the mixing layer. This dictates where the smoke in the mixing layer will be transported. Mixing and transport conditions will typically be more favorable mid-day and very poor in the early morning and at night when temperature inversions are likely to hold smoke down near the surface.

Nighttime burning is generally not recommended because smoke dispersion and subsequent visibility is typically worse at night. Smoke tends to hang close to the ground at night because of surface temperature inversions, declining temperatures, calming wind, and increasing humidity. This causes visibility and health concerns for the burn crew, motorists, nearby towns, etc. In addition, darkness of night can cause safety issues for the crew and responding emergency personnel.

Smoke management is a concern regarding nearby overhead power lines (distribution and transmission). Smoke consists of particles of carbon, which are electrically conductive. Under certain conditions, a smoke plume rising through power lines can discharge electricity (arcing or flashover) to people on the ground.

For more information reference Basic Smoke Management Practices and Smoke Management for Prescribed Burning.

H. Hazards and Precaution Areas

Hazards and precaution areas are areas or objects of special concern because of their potential to cause an accident, fire escape, or erratic fire behavior. These should be noted in the burn plan, along with an appropriate action to address them. The following are hazards that have not previously been mentioned in the other topic areas.

Spotfires (ignited by wind-blown firebrands) are a common type of fire escape. Sources of these firebrands are often woody fuels within the burn unit that are too close to the firebreak. By moving brush piles and volatile fuels 300-500’ from the interior edge of the firebreak, a buffer is created, and spotfires are significantly reduced. Spotting from volatile fuel can be additionally minimized by burning when the temperature is below 60° F and relative humidity above 40%. However, site specific goals should influence the weather parameters to meet the objectives of the burn.
For more information see figures 1 & 2 and reference Prescribed Burning: Spotfires and Escapes.

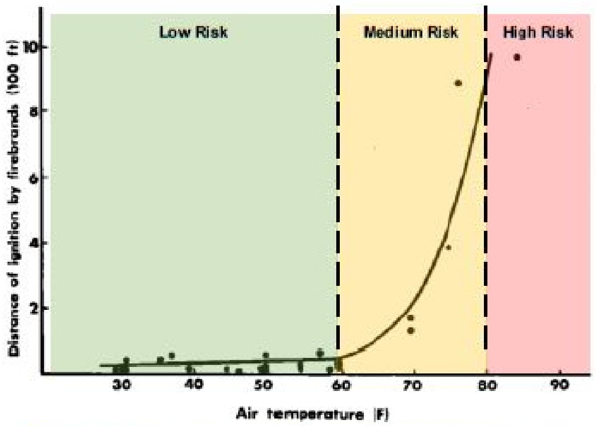


Figure 1. The maximum distance of spot fires from prescribed fires in relation to air temperature. Spot fires within 60 feet of the main fire could have been caused by flaming or non-flaming firebrands. (Adapted from Bunting and Wright, 1974. Risk factors have been added to the chart to offer guidelines as to the risk associated with temperature.)

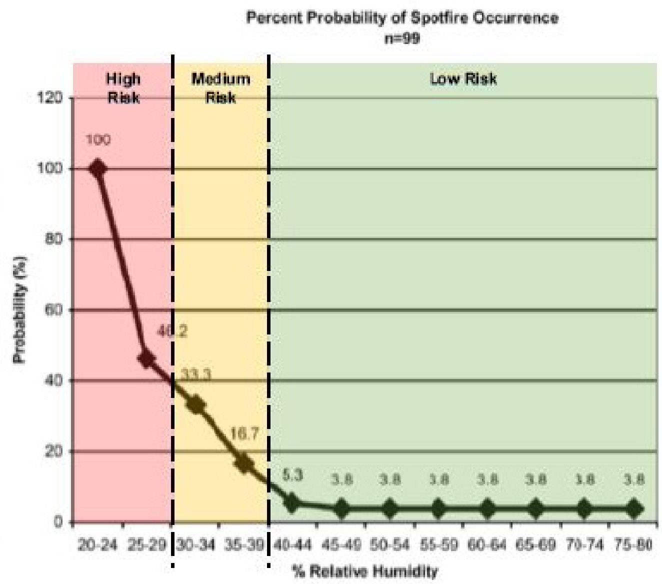


Figure 2. The percent probability of spot fires as a function of relative humidity determined from 99 prescribed fires conducted across Oklahoma from 1996 to 2002. Spot fires were related primarily to a critical level of relative humidity. (Adapted from Weir, 2007. Risk factors have been added to the chart to offer guidelines as to the risk associated with humidity.)

Fire whirls or “fire devils” are created when hot air rapidly rises out of a fire, carrying embers, debris, and combusting gases in a flaming vortex. These can reach extreme temperatures and move erratically, threatening the safety of the crew and posing a threat of a spotfire or escape. Fire whirls can be caused by burning under “low-wind” or “no-wind” conditions, burning headfires into backfires, and burning in canyons or hilly terrain. Avoidance of those wind conditions and firing techniques will reduce the chance of fire whirl development.

Changes in vegetation composition and/or density that will cause a change in fire behavior should be noted.

Volatile herbaceous and woody fuels can be hazardous and should be accounted for when planning for prescribed burns. Eastern redcedar, red slash piles, and switchgrass are common examples of volatile fuels.

Problematic plants on or near the fire line typically found in Nebraska includes eastern redcedar, ponderosa pine, cottonwoods, blackberry, sand sagebrush, fragrant sumac, annual bromes, switchgrass, lovegrass, purpletop, cordgrass, sericea lespedeza, yucca, currant, kochia, white snakeroot, pampas grass, phragmites, and cattails.

Problematic debris on or near the fire line in Nebraska includes grass thatch, brush piles, downed limbs/deadfall, standing snags, woody mulch, livestock dung, old fence debris, and other like features that are susceptible to fire and capable of lingering heat and/or embers.

Cottonwoods and standing dead snags are often hollow, even if they do not appear as such, and can burn inside, emitting firebrands from considerable height during the prescribed burn or days following.

Ditches and other low areas often have significantly more fuel and more thatch, resulting in increased fire intensity and burn duration in those areas.

Large thickets (plum, blackberry, sumac, dogwood, etc.) often have very little fine fuel within and can be an obstruction to continuous fire front advancement, forming a “fire shadow” downwind.

Red slash branches and single trees should be placed at a minimum 100’ interior or exterior of the planned firebreaks.

Ideally, red slash piles should be burned under appropriate conditions prior to the execution of the prescribed burn but that may not always be feasible. Red slash piles should be placed at a minimum of 300’ interior of the planned firebreaks or excluded from the burn unit all together. Exterior red slash piles should be located away from the firebreaks with the following distances determined by the planned wind direction:

- Upwind & Downwind Flank: 200’
- Downwind: 300’
- Ideally 300’ in all situations

Utilization of the cut & stuff technique to enhance eastern redcedar mortality should be carefully planned to reduce the risk of spotfires or escape. Cut/stuff should not be planned within a minimum of 300’ (ideally 500’) from the firebreaks. For more information reference Cut and Stuff Practices for Enhanced Cedar Control with Prescribed Fire.

Bare surface roads and railroad grades often are a false security as firebreaks because bridges and culvert tubes beneath roadbeds are conduits that can connect with fuel on the opposite side, outside the burn unit. In addition to posing a potential for fire escape, bridges often have a wooden structure, for which the party responsible for the burn may be liable, if damaged.

In addition to the risk of smoke causing electrical arcing from power lines, there are other risks associated with power lines. Power line poles are typically wood and can catch fire if not appropriately cleared around or excluded from the burn unit. The party responsible for the burn may be liable for damaged poles. Water sprayed upward on a burning pole can come into contact with high voltage wires, causing electrocution. If a pole is compromised by fire and the wires come downward, they pose a direct electrocution risk to the crew that contact them and an indirect risk if they come down on a fence and electricity is then conducted through the fence wire.

Oil and gas infrastructure and the associated lease roads typically have bare soil around them and can be incorporated into a firebreak system. They can also cause discontinuous fire front issues if they are within a burn unit. In addition, if hot headfires are run into oil and gas facilities, they may explode. Mowing and/or back burning around these areas may be a consideration.

Farmsteads and houses are a concern, not only from the aspect of smoke exposure, but also direct heat and fire contact. Firebreaks and ignition sequence should be done with protection of these in mind.

Tree and shrub plantings bordering burn units should be protected by firebreaks. It is recommended to avoid running headfires into tree rows that are desirable.

Hay bales should be moved away from the burn unit, if possible. If they must remain, they should be appropriately protected by firebreaks and firing techniques.

Topographic features that will have an anticipated effect on fire behavior should be noted and planned for appropriately. This includes canyons which can create fire whirls and slopes in which fire progresses rapidly upward.

Anything that creates difficulties for travel of the burn crew and vehicles is a hazard that should be noted. These may include fences, junk piles, old farm equipment, steep ditches, wet areas, and streams. Travel hazards that are not along fire lines but within and outside the burn unit should also be noted in case of the need to tend to an escape.

The burn plan should include a strategy to get the ignition crews and suppression support in a continuous manner along the fire lines.

If a hazard or a precaution area increases the risk of fire escape, the crew will be made aware and may warrant posting a lookout in that area.

This guidance does not outline an all-inclusive listing of hazards and precautionary areas but mentions a few of the common things encountered.

Taking the time to inventory hazards and precaution areas, and subsequently planning and making field preparations, can greatly reduce the threat these areas pose to the safety of the crew and the potential for fire escape.

I. Grazing Considerations

The grazing management before and after a prescribed fire can dramatically impact the level of success for the desired vegetative composition, quality, or cover resulting from the burn.

Grazing can serve as the means to manage fine fuel levels prior to a fire. To carry a continuous fire front, a minimum of 1,500lbs/ac of fine fuel is ideal. In many cases involving light fuel loads, continuity can be more important than fuel load in carrying a continuous fire front. To achieve this minimum amount of fine fuel and continuity, partial or full grazing deferments will likely be necessary to carry fire and meet management objectives of the burn. Timing of grazing prior to the prescribed fire, as well as the composition of herbaceous plant species present, will dictate if a partial or full growing season grazing deferment is needed.

When the primary economic return from the land is derived from grazing livestock, it can be difficult to maintain production income and achieve the necessary fuel load to facilitate a prescribed burn that meets objectives. Landowners that find it challenging to establish alternative grazing locations for livestock while building fine fuels, consider the conservation practice Annual Forages for Grazing Systems (810) to plant and graze annual forages on cropland while deferring the burn unit to grow fine fuels.

On severely overgrazed or encroached areas dominated by invasive cool season grasses, a single prescribed burn cannot guarantee a desirable shift in species composition to native grasses or forbs. To reach this objective, an integrated treatment approach using grazing management, herbicide treatments, interseeding, and/or timely subsequent burns may be necessary.

When a portion of a pasture is burned, grazing management should be adjusted based on the portion that burned, unless the burn is part of a patch burn grazing system. Burning will alter grazing patterns, causing livestock to spend a significant amount of time grazing the freshly burned area. For more information on patch burn grazing reference Patch Burn Grazing, Patch Burning Integrating Fire and Grazing To Promote Heterogeneity, and Rangeland Grazing Systems - Patch-Burn Grazing.

J. Vegetation and Soil

Eastern redcedar is a native tree with volatile compounds that make it susceptible to mortality through fire. Cedar trees less than 1' tall are killed by nearly any type of fire and burning conditions. Fuel loading become the most important factor for taller trees. When fuel loads exceed 4,000lbs/ac, trees from 1' – 5' tall can be consistently controlled, but tree mortality declines with fuel loads less than 3,000lbs/ac. For more information reference Cedar Control by Individual Scorched-tree Ignition Following Fire.

Timing of burning should be commensurate with soil and site conditions to maintain site productivity and minimize effects on soil erosion and soil properties (structure, soil moisture).

Some undesirable plants may grow and increase following a burn. For example, sericea lespedeza is increased by spring burning, but reduced by growing season fire. Remedial action should be recommended to prevent an increase in unwanted plants, when applicable.

The rooting depth should have enough moisture to support recovery of the desired plant species following the burn.

Burning in the fall (or during dry conditions) can result in crown damage to bunchgrasses, particularly when there has been a build-up of thatch. This may be an objective for certain wildlife habitat management practices but could be deemed detrimental for livestock forage. The decision to use dormant versus growing season burning depends upon the vegetation management objectives of the client, as well as the risk and the species of concern.

Late growing season, fall, or winter burning may result in wind erosion on sandy soils (erosion on other soils is dependent upon the topography) even though burning may have occurred historically. Usually, sufficient plant material remains to prevent excessive erosion, but erosion potential should still be considered. Develop a detailed mitigation plan to stop erosion if an unexpected deficit of soil cover is experienced.

K. Wildlife

If the burn is specifically being used to manipulate wildlife habitat, to promote the desired plant community for the management species; refer to Tables 2 and 3 (page 13). Burning can often be used to manipulate vegetation to create a mosaic, maximizing heterogeneity of the area. Fire can aid in the management of different nesting, brooding, and breeding habitat requirements of ground nesting birds. Often, fire is used in combination with grazing (such as in patch burn grazing) to achieve this result.

Burning can remove heavy litter layers that would be restrictive to the mobility of broods. Burning in late fall, winter, or early spring can promote forb growth for brooding habitat.

Burns can also be disadvantageous to habitat requirements if the desired habitat already exists. Timing and spatial scale of a burn can be adjusted to avoid or minimize undesirable effects. Regulations such as the Endangered Species Act, Migratory Bird Treaty Act, and others may require modification of timing or application of the burn to reduce or avoid impacts on wildlife or plant species.

Burning can cause wildlife mortality. Ignition sequences can be tailored to provide opportunity for escape. Strip firing and flank firing will allow more escape time than a ring firing sequence.

To find information on wildlife impacts reference links in section "I. Grazing Considerations" and "Q. Additional Resources."

L. Notifications

To fulfill legal obligations, as an act of courtesy, and to limit liability, multiple notifications should be made prior to burning. A landowner or designee should notify 911 dispatch, the fire department, the sheriff's department, or emergency management as outlined in the local burn regulations.

All surrounding landowners and residents in close proximity should be notified. Residents in the downwind airshed that may be affected by smoke should also be notified. Typically, those within the first ½ mile are the most critical, but that may need to be extended if it is known that conditions exist with residents further downwind. If utility infrastructure is present (power lines, oil and gas, pipelines, etc.), it is recommended that those utility companies also be notified well before the intended burn date, so that they may prepare if needed, or at least be aware of the upcoming burn.

M. Crew Clothing and Health

All burn crewmembers should wear flame resistant clothing (100% cotton, Nomex®, or other flame-resistant material), leather gloves, hat, and leather boots. Polyester or nylon clothing, tennis shoes, sneakers, sandals, shorts, or other inappropriate clothing should not be worn on a prescribed burn. Protective eyewear may be desirable, particularly for crew members wearing contact lenses. For crew members in smoky areas, respirators or other breathing apparatus may be desirable.

Prescribed burning can be physically strenuous. All crewmembers should be in good physical condition to enable them to perform all necessary tasks. Growing season burns can produce more strenuous working conditions than spring burns, with higher temperatures and increased smoke levels. Dangerous working conditions resulting from high temperatures, high humidity, and fire-retardant clothing will be discussed with the client/crew conducting the burn activities under these conditions. Adequate fluids should be consumed during the prescribed burn to avoid dehydration. If a burn is to last a full day, food should also be considered to prevent fatigue.

N. Crew Responsibilities

The fire boss should be the sole leader and coordinator of burn activities. Prior to burning, it is the responsibility of the fire boss to ensure that weather, firebreaks, crew, and equipment are within prescription parameters. If those conditions are not satisfied, then the fire boss should postpone the burn. If the burn is a go, then the fire boss should brief the crew on the plan and their individual responsibilities during the burn. All crew should have a concise understanding of the procedures for conducting the burn, operation of the equipment, fire escape contingency plans, and location of safety zones. All crew members should have a map of the burn unit with them.

The fire boss should consider gathering the crew following mop-up to debrief the outcome of the prescribed burn. This is a great way to evaluate good and bad situations that may have taken place during the burn procedures and provide an opportunity to learn and adjust for future prescribed burns.

O. Conducting the Burn

Ensuring reliable burn crew options exist is very important when planning to implement a prescribed burn. The most common burn crew resources found in Nebraska that may be available to landowners include local prescribed burn associations, hired contractors, or local volunteer fire departments.

The fire boss should direct the sequence of ignition and suppression events, as laid out in the burn plan. Crew members should have access to radios to facilitate communication. The crew should stay in contact with the fire boss and each other pertaining to progress, slops, spots, or escapes, and other burn operational needs. All needed equipment, fuel, and water should be onsite prior to ignition and should be in running order. Typically, vehicle and pump engines will remain running throughout the entirety of the burn and mop-up procedures.

A test fire should be utilized at the determined ignition point to evaluate fire behavior, smoke effects, and probability of accomplishing the resource objectives.

For more information reference Oklahoma Prescribed Burning Handbook and Prescribed Burn Equipment.

P. Mop-Up

Mop-up is the process of checking the entire perimeter of the burn area to ensure that all fires or smoldering materials are out or removed from the edge of the perimeter to a safe location inside the burned area. Long duration fuels (brush or red slash piles, downed limbs, deadfall, yucca plant, fence posts, cow chips etc.) may smolder for several days after the burn and pose the risk of escape post mop-up due to continued firebrand emittance and possible changes in wind direction and/or speed. Mop-up may involve moving smoldering debris and falling/dragging burning trees far enough interior of the burned unit, drenching with water, and/or smothering with soil. It is the responsibility of the fire boss to ensure that the perimeter is secure and overall risk of escape is eliminated before releasing the crew. Planning and effort in burn preparation will greatly ease the mop-up process.

General mop-up guidelines are to put out all flames and smoke within 50' of burn line, all heavy fuels within 100' of burn line, and all snags within 150' of burn line. Site specific mop-up procedures should be included in prescribed burn plans when necessary.

Observation times:

- Light Fuels (grass only): 12 hours
- Moderate Fuels (grass and/or shrubs): 24 hours
- Heavy Fuels (trees with grass/shrubs): 72 hours
- Longer mop-up periods may be necessary based on site specific fuels and extended weather forecasts.

Table 2. Burn Objective Considerations for Warm Season Perennial Grass Systems

Objective	Considerations	Control Burn Frequency	Maintenance Burn Frequency
General Maintenance	Fire historically shaped the prairie landscape, and it is recognized as a vital component in maintaining a prairie ecosystem. Maintenance burns can be used to create heterogeneity on a landscape scale, improve forage quality, and maintain or improve health and vigor of prairie plant communities.	N/A	As needed, or Tallgrass: 2-3 years Mixed Grass: 3-5 years, Shortgrass: 5-10 years
Improve Browse or Cover	Dormant season fire; mid-January to 3 weeks prior to green-up of browse species.	N/A	As needed
Increase Forbs	Dormant season burns, typically conducted February through March; and growing season burns, typically conducted July through September.	N/A	As needed
Deciduous Brush Control	Late dormant season burns, typically late April, and growing season burns, through September. Burn from leaf emergence into full leaf stage. Pre-burn management may be necessary to increase herbaceous fuels within brush stands. Buckbrush: late April to early May.	1-2 years	3-5 years
Juniper Control	Dormant and growing season burns; year-round maybe sufficient. Growing season burns utilizing higher ambient air temperature have greater efficacy across increasing tree sizes. Consider herbaceous fuel load of 3,000lbs/ac + for dormant season control of trees <6' tall and for growing season control of trees >6' tall.	1-2 years	3-5 years
Prickly Pear Cactus Control	Growing season burn, typically July through September.	As needed	As needed
Annual Herbaceous Plant Control	Burn after germination of target species. May be late dormant season for cool season species or early growing season for warm season species.	As needed	As needed
Cool Season Perennial Grass Control	Late dormant season burn (April): when target cool season species has raised growth points, and warm season grasses are just starting to emerge.	1-2 years	As needed
Sericea Lespedeza Control	Growing season burn; August 1 through flowering. Note that burning alone will only reduce seed production. Other means of control are necessary to address existing, established plant populations.	3-4 years	As needed
Reduction of Thatch	Dormant or growing season burns.	As needed	As needed

Table 3. Burn Objective Considerations for Cool Season Perennial Grass Systems

Objective	Considerations	Control Burn Frequency	Maintenance Burn Frequency
Improve Forage Quality/Quantity	Burn as near to green-up as possible for desired species. Early dormant season fire; typically, February through mid-March.	N/A	3-5 years
Deciduous Brush Control	Growing season burns. July through August. Burne while target brush species is still actively growing, but before cool season grass fall growth. Pre-burn management may be necessary to increase herbaceous fuel within brush stand.	1-2 years	3-5 years
Juniper Control	Dormant and growing season burns. Growing season burns utilizing higher ambient air temperature have greater efficacy across increasing tree sizes. Consider herbaceous fuel load of 3,000lbs/ac + for dormant season control of trees <6' tall and for growing season control of trees >6' tall.	1-2 years	3-5 years
Annual Herbaceous Plant Control	Burn after germination of target species. May be early growing season for warm season species. Fire may not be primary means of control.	As needed	As needed
Sericea Lespedeza Control	Dormant and growing season burns; year-round maybe sufficient. Growing season burns utilizing higher ambient air temperature	N/A	As needed
Reduction of Thatch	Early dormant season burn; February through mid-March	As needed	As needed
Note: Primary burn window in managing cool season grass systems is the latter half of winter dormant season, February through mid-March. However, if control of unwanted species is needed, growing season burns may be warranted, but need to be done prior (July through August) to fall growth of cool season plants.			

Q. Additional Resources

Oklahoma State Extension - Prescribed Fire , The Prairie Project, Great Plains Fire Science Exchange , Working Lands for Wildlife , Nebraska Extension Publications - Fire, Nebraska Pheasants & Quail Forever, Nebraska Prescribed Burning SharePoint

R. References

USDA NRCS Kansas, Practice Specification, Prescribed Burning (Code 338).

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