Photographic Handbook for Comparing Burned and Unburned Sites Within a Dry Forested and Grassland Mosaic: A Tool for Communication, Calibration, and Monitoring Post-Fire Effects

Theresa Jain, Molly Juillerat, Jonathan Sandquist, Mike Ford, Brad Sauer, Robert Mitchell, Scott McAvoy, Justin Hanley, and Jon David

Without Fire

With Fire

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Abstract

This photograph handbook describes characteristics and burn severity of a dry forested and grassland mosaic that burned within the last decade. We show photographs of different burned and unburned sites to help compare fire occurrence in similar stands. The handbook provides local land managers with a quick, inexpensive, and efficient way to evaluate effects of prescribed fire, wildfire, or a combination of the two, based on current conditions of unburned sites. This handbook can be used as a communication, calibration, or monitoring tool. It also contains a CD that documents the vegetation and soil effects from prescribed, wild, and combined fire effects in our study.

Keywords: prescribed fire, wildfire, fuel treatments, ponderosa pine, grasslands, Rocky Mountains

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Introduction

Monitoring the effects from wildfires and prescribed fires is a component in resource management (for example, Healthy Forests Restoration Act 2003). When monitoring effects from disturbances, the preferable technique is to characterize forest overstories (crown fuels) and surface conditions (surface fuels) prior to a disturbance event, then return to the same location and characterize forest structure and other aspects such as burn severity after the disturbance. However, the location of a future forest disturbance, such as a wildfire, is usually unknown. It also may not be economical or feasible to conduct a complete forest inventory or to establish a grid of plots that is large enough to ensure sufficient pre-disturbance data. There is no specifically located pre-disturbance data from the Missouri River Breaks in either the prescribed fire or wildfire areas. Moreover, no data were collected on specified locations after the prescribed fires. Because of this, alternative methods are needed that will provide data to address post-disturbance evaluation and/or monitoring needs. This handbook uses an alternative method (see the CD that accompanies this handbook: Jain and others 2007b) that we developed for monitoring and evaluating environments created by a series of fires where no pre-disturbance information is available.

Purpose

This photograph handbook describes characteristics and burn severity for a forested and grassland mosiac along the Missouri River Breaks in eastern Montana that burned within the last decade (fig. 1). In this document, we define burn severity as the condition of live and dead vegetation, forest floor, and soil surface in the post-fire environment (Jain and others 2004). Sites in an area with no recent fire activity are used to provide a reference for comparison to nearby burned sites. This is accomplished through the use of quantitative descriptions and photographs obtained after two wildfires burned through and around areas burned by past prescribed fires. The purpose of this handbook is to provide local land managers with a quick, inexpensive, and efficient way to: 1) evaluate effects of prescribed fire, wildfire, or a combination of the two, based on current conditions of unburned sites within a set of physiographic positions, 2) provide photographs

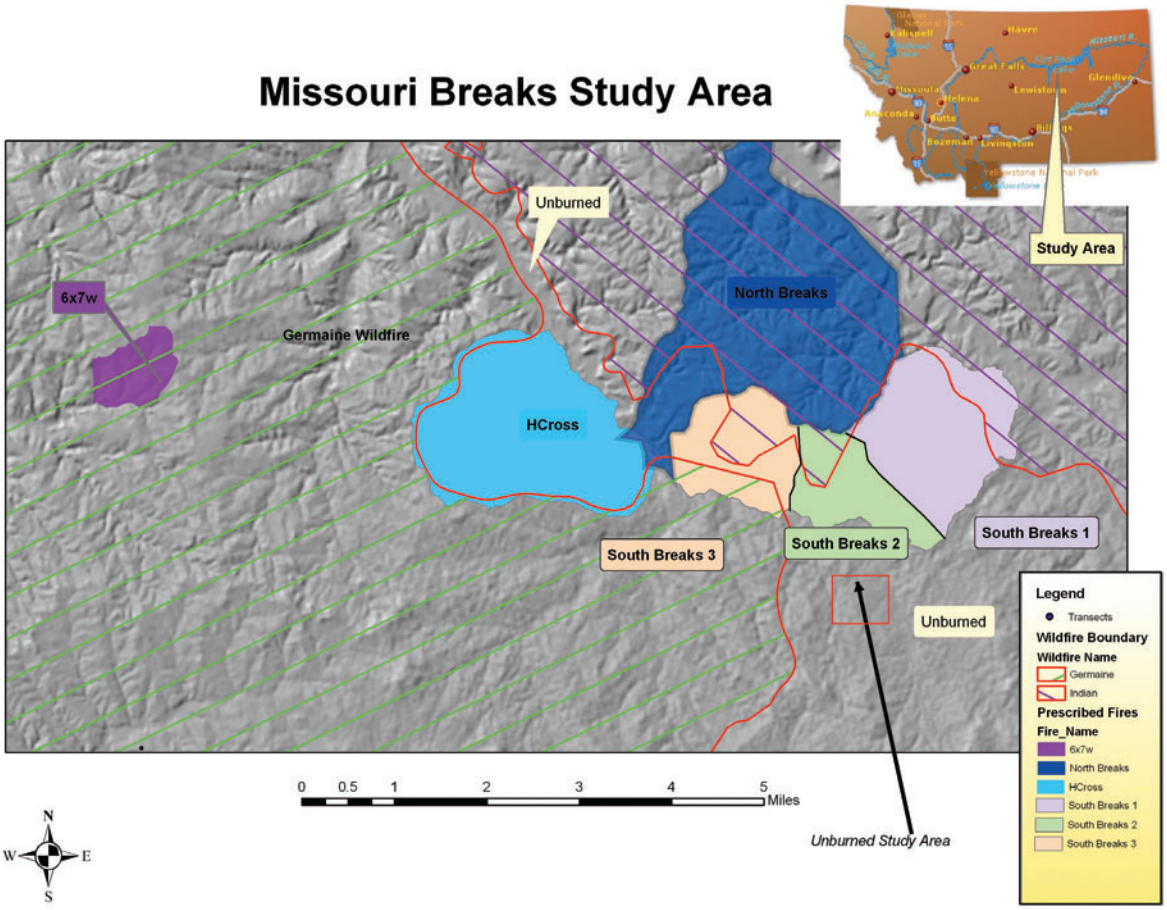

Figure 1—The study area is located within the Missouri River Breaks in eastern Montana. The study developed methods to compare post-fire outcomes of the following prescribed fires: 6X7W (burned in 1998), South Breaks 1, 2, and 3 (burned in 2001), HCross (burned spring of 2003), and North Breaks (burned spring of 2003). In August of 2003, a series of lightning storms ignited several fires along the Missouri River Breaks; two of these fires (Indian and Germaine) burned more than 100,000 acres through and around the prescribed fires. These provided an opportunity to evaluate fire effects of wildfire alone, prescribed fire alone, and prescribed fire followed by wildfire. We used sites that had not burned as a frame of reference to compare with burned sites.

of different burned and unburned sites to use as a communication tool, and 3) compare fire occurrence in similar stands to the outcomes in this handbook as a monitoring tool.

When developing this handbook we identified a high amount of variability in relation to burning conditions and fuels. Therefore, this handbook provides examples of what may occur in similar places burned by a wildfire, prescribed fire, or a prescribed fire that was also burned by a wildfire (combined fire event). It is important to recognize that weather, physical setting, and other factors in addition to vegetation (fuels) influence a particular post-fire outcome (Fischer and Clayton 1983). Although this handbook characterizes areas along the Missouri River Breaks in eastern Montana, it can be used as a template for those who wish to

develop similar photograph handbooks in other areas. In addition, the handbook can be useful for characterizing landscapes that have similar physiographic and vegetative characteristics.

Area Described

The Missouri River Breaks consists of public lands administered by the United States Department of Interior's Bureau of Land Management (BLM) and the Montana State Department of Natural Resources and Conservation, with many large private ranches interspersed throughout the region. The Missouri River Breaks historically consisted of areas characterized by grasslands and areas with small patches of trees. These patches of trees have become more extensive since European settlement. Historical photographs (USDI 1979) taken in the early 1900s, re-taken in the late 1950s and 1960s, and taken again in 1977 of identical scenes, often show a remarkable expansion of ponderosa pine (*Pinus ponderosa*).

Today, vegetation in the area described in this handbook is composed of warm-dry ponderosa pine, interspersed by grasslands (Fisher and Clayton 1983). The ground level cover includes continuous or patchy grass, ponderosa pine needle mats, shrubs, and dense tree seedlings and saplings similar to characteristics in dry forests (fig. 2). Overstory cover ranges from scattered individual trees to patches of continuous cover. Grassland vegetation consists of little bluestem (*Schizachyrium scoparium*), prairie sandreed (*Calamovilfa longifolia*), blue grama (*Bouteloua gracilis*), western wheatgrass (*Pascopyron smithii*), prairie junegrass (*Koeleria macrantha*), green needlegrass (*Nassella viridula*), creeping juniper (*Juniperus horizontalis*), silver sagebrush (*Artemisia cana*), skunkbush sumac (*Rhus trilobata*), and Wyoming big sagebrush (*Artemisia tridentata* spp. *wyomingensis*).

The Indian (33,954 acres) and Germaine wildfires (66,496 acres) burned along the Missouri River Breaks in eastern Montana in 2003 (fig. 1). These wildfires burned in and around several prescribed fires (ranging from 200 to 3000 acres) that were applied in 1998 (6X7W), 2001 (South Breaks), and 2003 (North Breaks and HCross). The unburned sites in this handbook reflect conditions where a departure from historical conditions has occurred, due to fire exclusion (USDI 2004). In addition, livestock grazing has occurred within the area (Mackie 1970). Similarly, the burned sites were places where fire had been excluded and livestock grazing had occurred in the past (USDI 2004).

Development of Handbook

Forest characteristics and photographs were obtained in two stages during July and August of 2004. First we characterized and photographed sites within areas experiencing no recent fire activity and developed an operational photograph handbook. Next, we characterized and photographed the sites that had experienced either a wildfire, prescribed fire, or a prescribed fire followed by a wildfire. Because we did not have any specific data or photographs of the vegetation prior to the fires, we used the photograph handbook for unburned areas, as a frame of reference to compare differences in tree density in a post-fire environment (fig. 1).

Quantifying Forest Structure of Unburned Sites

Sampling Design—We used a stratified random sampling design to identify the unburned reference areas using physiographic position (strata 1) and overstory tree density (strata 2) (table 1) (Jain and others 2007a). We randomly selected several locations that contained the two

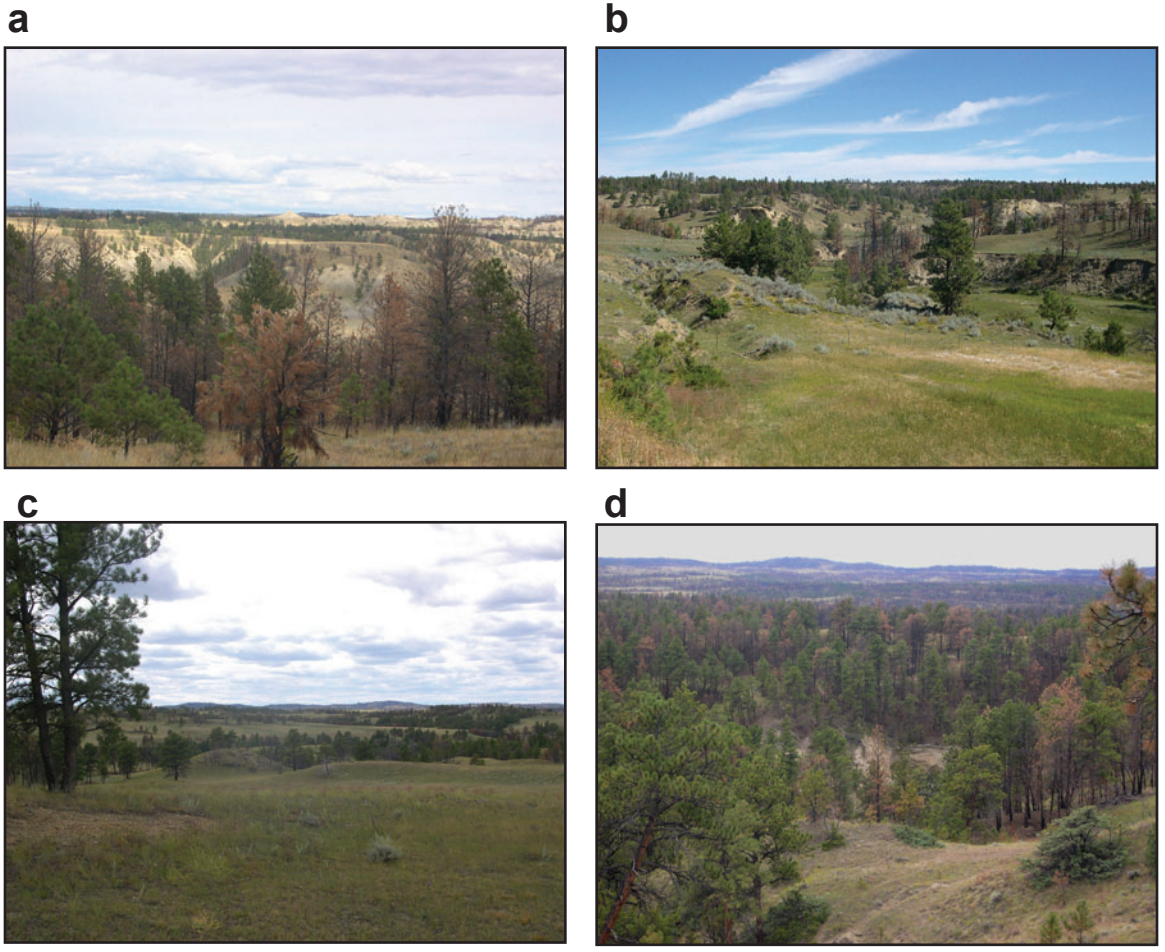

Figure 2—There was considerable variation in both forest structure and burn severity throughout the study area, as illustrated by photographs taken on: (a) North Breaks prescribed fire and wildfire combined, (b) South Breaks 3, (c) HCross, and (d) North Breaks prescribed fires.

strata (for example, riparian/low density). Within each location, a two-person crew randomly located a starting point and a random direction and began walking along a linear transect. As each crew crossed a physiographic position, they established a random plot (50 feet from the transect, with direction dictated by location of a second hand on a watch) that contained the lowest density of trees based upon canopy cover. After this plot was located and data were collected, the crew returned to the transect and continued to walk until they located a medium density site containing twice the density of the low density plot. This continued until the crew located a low, medium, and high density (twice the density of medium) plot within the specified physiographic position. This process was repeated until we obtained three to five sites

Table 1—For unburned sites, the minimum, median, maximum trees per acre, average basal area, and average percent cover for each tree density class within a physiographic position.

Physiographic position	Density	Description				
		Trees per acre			Average basal area (ft^2/acre)	Average canopy cover (%)
		Minimum	Median	Maximum		
Riparian	Low (n = 3)	0	216	552	8	9
	Medium (n = 3)	669	864	956	43	32
	High (n = 3)	525	1306	1704	84	54
South aspect	Low (n = 6)	0	41	120	19	11
	Medium (n = 7)	72	163	464	43	29
	High (n= 6)	744	1128	2300	120	67
North aspect	Low (n = 8)	0	240	1104	10	11
	Medium (n = 6)	261	490	1200	56	39
	High (n = 6)	744	1116	1920	110	66
Ridge or bench	Low (n = 3)	0	24	38	7	4
	Medium (n = 3)	192	336	816	6	12
	High (n = 3)	336	712	840	89	57

(replications) containing the specified density and physiographic combination (Jain and others 2007a).

Data Collection—Because there was little coarse woody debris (CWD) in the area where data collection took place (based on a sub-sample evaluation), we did not continue to do transects to estimate tons per acre for dead and down woody fuels. Ocular estimates of the soil surface (litter and mineral soil exposure) and cover for grass, forbs, and low (≤ 0.2 inch basal stem diameter or ≤ 1.0 foot tall) and medium (> 0.2 inch basal stem diameter or > 1.0 foot tall) shrubs were described using a 1/300th acre circular plot. Trees ≤ 12.0 inches diameter at breast height (dbh) (4.5 feet) were quantified using a 1/24th (24 foot radius) acre circular plot. Trees exceeding 12.0 inches dbh were quantified using a variable radius, proportional to tree size, defined by a 20 basal area factor prism (Dilworth 1970). Data collected on trees included diameters, heights, canopy base height, and uncompacted crown ratio (fig. 3a). Tree data were then summarized using the Forest Vegetation Simulator (FVS), eastern Montana variant (Crookston and Stage 1999; Dixon 2003; Wykoff 1986; Wykoff and others 1982) (table 2). Summarized data included trees per acre, snags per acre, total cubic foot volume, merchantable cubic foot volume, basal area, and canopy cover (table 2). These summaries were placed into four tree height classes: ≤ 6 feet, > 6 to ≤ 12 feet, > 12 to ≤ 23 feet, and > 23 feet (table 3). For the photographic component, a hard hat was placed on plot center and a close and distant view of the plot was photographed. The photographs and the summarized data tables were then used to create an operational photograph handbook, which was later used in our data collection and characterization of the areas burned either by the wildfire, prescribed fires, or both. Jain and others (2007a) published a modified version of this handbook illustrating the vegetation characteristics of the unburned plots.

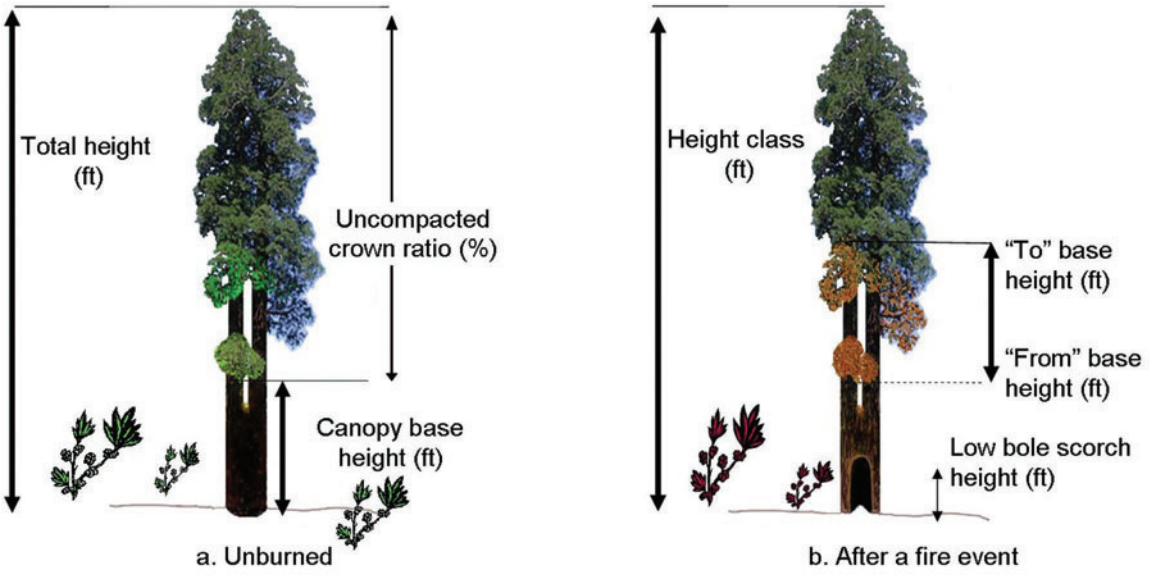

Figure 3—An illustration of how we quantified crown ratio (a), canopy base height (a), and total height (a). After the fire event, the rise in canopy base height between the pre-fire (from) and the post-fire (to) was measured directly, based on live branch locations (b) on burned sites.

Quantifying Forest Structure and Burn Severity in Burned Areas

Sampling Design—Although individual plots are typically used to quantify fuels (for example, Maxwell and Ward 1980; Morgan and Shiplett 1989), landscapes within the Missouri River Breaks are highly heterogeneous in topography and vegetation. Therefore, we used randomly located transects to quantify burn severity within the different burned areas. Because fires can burn heterogeneously, due to factors such as local weather conditions, fuel moistures, fuel loadings, physical setting, and variation in vegetation (fuels), we determined that individual plots would not capture the extreme variability we observed in the area (fig. 2). Summer rain storms (relatively often) create conditions where soils become slippery and sticky from the high clay content (gumbo), creating conditions impossible for walking and or driving (Healy 2005). Therefore, data needed to be collected in a short period of time between rain storms (maximum 10 day period). The area is very remote, the burned areas are quite large, and in some places they are inaccessible. When considering these factors, as well as the potential for thunderstorms and our short data collection period, we determined that linear transects would effectively quantify more surface area and cross many different physiographic positions, thus capturing more of the variation in tree density and severity. In addition, to save time and increase the sampling area, there was no designated transect width; rather, the area represented by a specific physiographic position and overstory density was characterized within the context of the unburned sites. This enabled us to quickly and efficiently characterize approximately 12 miles of distance in nine days.

Table 2—The following information describes forest characteristics, how they were measured, and the plot size used when obtaining the measurements on the unburned sites. Also included are the calculations and/or references used to summarize data.

Characteristics	Direct measurement (level of precision)	Plot size	Calculation used and/or literature reference
Forest floor and surface			
Litter, mineral soil exposure, grass, forbs, shrub (%)	Ocular estimate of proportion of cover (± 5%)	1/300th acre circular plot	Proportion of 1/300th acre plot presented as percent
Shrub biomass (tons/acre)	Number of basal stems in two diameter and height classes (low = ≤ 0.2 in or ≤ 1.0 ft tall; med = > 0.2 in or > 1.0 ft tall)	1/300th acre circular plot	Regression equation for estimating total above ground weight, based on number of basal stems for big sagebrush (*Artemisia tridentata*) and common Juniper (*Juniperus communis*) (Brown 1976)
Tree characteristics			
Trees & snags ≤ 12.0 inches diameter breast height (dbh) breast height = 4.5 feet	Tally by height (nearest foot), species, and diameter (± 0.1 in)	1/24th acre circular plot	Trees per acre = tree tally per plot multiplied by 24
Trees & snags > 12.0 inches diameter breast height (dbh) breast height = 4.5 feet	Tally by height (nearest foot), species, and diameter (± 0.1 in)	Sampling proportional to size using a 20 basal area factor prism	Stand table factor multiplied by tree count per plot in a diameter class (Dilworth 1970, page 267); Forest Vegetation Simulator (FVS), eastern Montana variant (Dixon 2003)
Total basal area (ft^2/acre)	Tally by height (nearest foot), species, and diameter (± 0.1 in)	1/24th acre circular plot, and through sampling proportional to size	Dilworth 1970, page 267; FVS, eastern Montana variant (Dixon 2003)
Total volume (ft^3 /acre)	Tally by height (nearest foot), species, and diameter (± 0.1 in)	1/24th acre circular plot, and through sampling proportional to size	FVS, eastern Montana variant (Dixon 2003; Wykoff 1986)
Merchantable volume (ft^3 /acre)	Tally by height (nearest foot), species, and diameter (± 0.1 in)	1/24th acre circular plot, and through sampling proportional to size	FVS, eastern Montana variant (Dixon 2003); merchantability standards: 1 foot stump height to a 2 inch top (Wykoff 1986)
Tree crown characteristics			
Canopy base height (ft)	Height from surface to lowest live branch (± 1.0 ft)	1/24th acre circular plot, and through sampling proportional to size	Average canopy base height for all trees within a height class per plot
Uncompacted crown ratio (%)	Percent of tree with crown from lowest live branch to top of tree (± 1%)	1/24th acre circular plot, and through sampling proportional to size	Average crown ratio for trees within a height class per plot
Total canopy cover (%)	Uncompacted crown ratio and tree species (± 5%)	1/24th acre circular plot, and through sampling proportional to size	Estimates of total canopy cover accounting for crown overlap, FVS, eastern Montana variant (Crookston and Stage 1999; Dixon 2003)

Each transect crossed two fire events (wildfire versus prescribed fire, or wildfire versus wildfire and prescribed fire combined) from beginning to end, with each transect ranging in length from approximately 3000 to 6000 feet horizontal distance, with 1200 to 3000 feet occurring within each particular fire event (fig. 4). We placed 31 transects within the combination of fire events, with a minimum of four transects per fire event. A UTM (universal transverse mercator) coordinate was obtained at the beginning and end of each transect and at the beginning and end of each individual physiographic (one of four) position that was defined as a transect segment (fig. 5).

Data Collection

After identifying a transect segment based on physiographic position, each crew used the photograph handbook developed from the unburned sites and selected an unburned vegetation plot occurring within a physiographic position and having similar tree density as the burned site and recorded the unburned plot number. After this, crews estimated the amount of live trees remaining after the fire by recording the percent change in tree density for each of the four height classes mentioned above. For example, if no trees burned in the fire event, then there was 0 percent change in density. If half of the trees

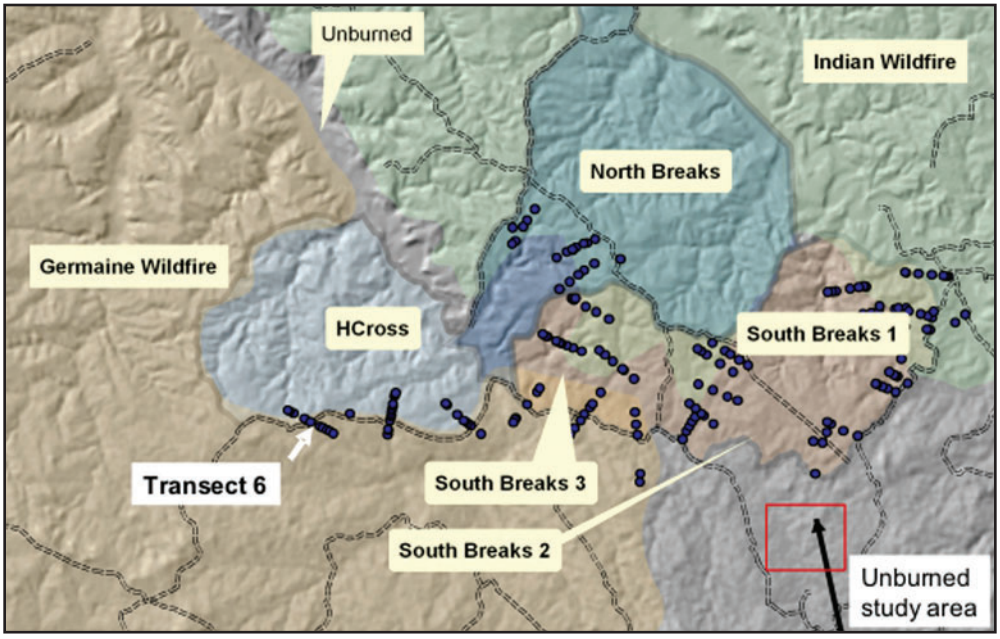

Figure 4—Illustration of transects used to quantify burn severity of soils, surface vegetation, and the canopy and change in tree density. As an example, transect 6 crosses the HCross and the Germaine wildfire event. This transect was approximately 6000 feet (horizontal distance) long. Observations were transect segments (between dots), indicating where forest structure and burn severity were characterized.

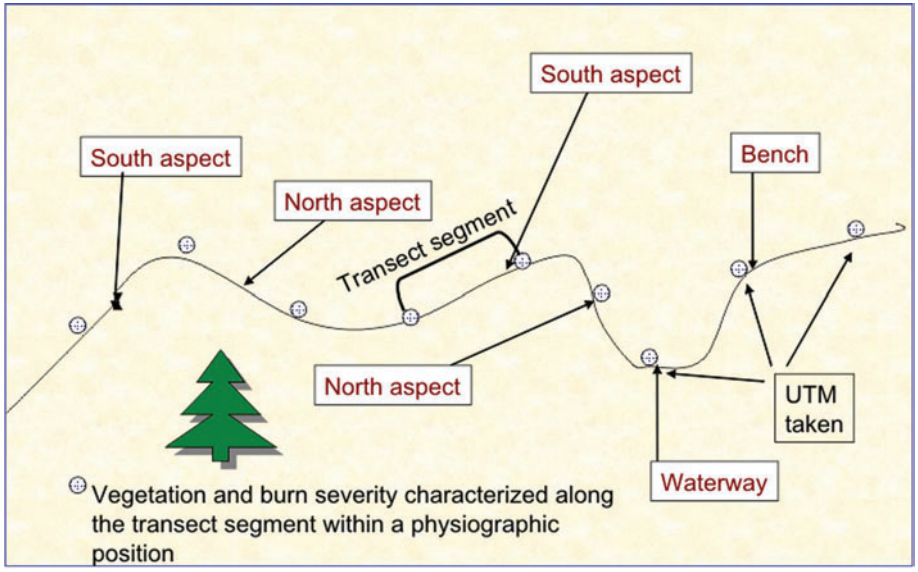

Figure 5—For each physiographic position (transect segment), forest structure (change in tree density) and the burn severity (what was left) were characterized. Coordinates were recorded in universal transverse mercator (UTM) at the beginning and end of each physiographic position, the beginning and end of the entire transect, and at the border between two fire events.

burned, then the value was 50 percent change in density. If the fire killed all trees, then the crew recorded 100 percent change. As crews walked through a transect segment, they estimated and recorded the post-fire percent cover of litter, mineral soil, grass, forbs, and low and medium sized shrubs. Within each tree height class, increase in canopy base height (for example, from 3 feet pre-fire to 5 feet post-fire) on live trees (fig. 3b) and the extent of low bole scorch height were estimated and recorded from burned trees in the identified transect segment.

In addition to these descriptions, the crews assigned codes based on estimated average crown scorch within each overstory tree height class. These were then placed into the burn severity classes defined below in the description of the data tables. To accompany the structure and severity estimates, a photograph was taken of the landscape, vegetation, and the surface (fig. 6).

Using the Handbook

The handbook is organized by the following physiographic positions: 1) waterways (ravines or gullies), 2) south-facing aspects, 3) north-facing aspects, and 4) benches or ridges. Within each of these, various conditions are illustrated by a pair of photographs accompanied by data tables (fig. 6, table 3). The two photographs show a site that is unburned (left side of page) and a site that is burned (right side of page). Although the sites depicted in the photographs are not the same sites, they have similar physiographic positions and forested or grassland characteristics.

Figure 6—Example of photographs showing a site where we obtained data quantifying vegetation characteristics and burn severity (table 3, facing page). The photograph on the left shows an unburned site (a frame of reference) used as a comparison to burned sites. The photograph on the right shows a forest burned by the North Breaks prescription fire followed by the Germaine wildfire. Similar photographs accompany each table in this handbook. Notice there is no post-fire canopy base height data in the table (table 3) because trees in the right photograph no longer contain green crowns.

To provide visual and numerical examples of sites experiencing one of three possible fire events, the photographs and data tables are ordered within each physiographic position by fire event (wildfire alone, prescribed fire alone, and prescribed fire followed by wildfire). For waterways, south-facing aspects, and north-facing aspects, 13 to 14 conditions of different fire events are given. There are two wildfires (Germaine or Indian) adjacent to prescribed fire (6X7W, HCross, and either South Breaks 1 and 3) events, five prescribed fire only events (HCross, North Breaks, South Breaks 1, South Breaks 2, and South Breaks 3), and six wildfire and prescribed fire combined (either of the two wildfires burning through each prescribed fire) events. For ridges or benches, there are 11 conditions: three wildfire (Germaine) adjacent to prescribed fire (HCross, and South Breaks 1) events, four prescribed fire only events (HCross and South Breaks 1, 2, and 3), and four wildfire and prescribed fire combined.

To characterize the wildfires alone we took observations in areas immediately adjacent to the prescribed fires. Although we have observations for prescribed and wildfire combined for South Breaks 2, we do not have any observations for the wildfire alone adjacent to this prescribed fire. This is because neither wildfire burned close to this prescribed fire (figs. 1, 4). We also do not have observations for the areas where the Indian wildfire (wildfire alone) burned adjacent

Table 3—Explanation of data tables: Tables describe vertical (A) and horizontal (B) tree structure, as well as soil surface and ground-level vegetation (C), to show the outcome of a unique fire event which matches photographs on each facing page.

We separated trees into four height classes: ≤ 6 feet, > 6 to ≤ 12 feet, > 12 to ≤ 23 feet, and > 23 feet (A1, B1). Vertical structure description (A) includes average diameter at breast height (inches) (A2), average tree height (ft) (A3), uncompacted crown ratio without fire (percent) (A4), and canopy base height (cbh) (ft) (A5). For A5, cbh pre-fire (from) is compared to cbh with fire (to) (fig. 3). A column (change) is included to show the difference in canopy base height resulting from the fire. In some cases these characteristics are not shown, because the tree crowns were entirely scorched or no needles were present. At other times, only some trees were scorched completely and some were left intact. In such situations, there was no change to the canopy base height. Also included in this section of the table is average low scorch height (ft) (A6), which is the lowest extent of scorch on the tree resulting from the fire.

Horizontal tree description (B) includes horizontal spacing (codes defined in footnote 1 below table) (B2), tree burn severity (classes defined in footnote 2 below table) (B3), trees per acre (B4), total cubic feet (ft^3/ acre) (B5), and merchantable cubic feet (ft^3) (B6) (table 2). For B3, B4, and B5, with and without fire data is given, as well as the change in trees per acre when comparing areas without fire to those with fire. These descriptions are for ponderosa pine, although we note the presence or absence of Rocky Mountain juniper in the areas with fire, along with the percent alive (B7).

The soil surface and ground-level vegetation (C) were characterized by ocular estimates of percentage cover for 1) litter (discernable dead needles, grass, and leaves), 2) mineral soil exposure, 3) live grass, 4) live forbs, 5) low shrubs (≤ 0.2 inch basal diameter or ≤ 1.0 foot tall) and 6) medium shrubs (> 0.2 inch diameter or > 1.0 foot tall).

Condition 38: Site where the Germaine wildfire burned through prescribed fire North Breaks

Slope: > 25%								**Substrate**	**% cover (C)**	
Vertical tree description (A)									**w/o fire**	**w/ fire**
Tree height class (ft) (A1)	**dbh (in) (A2)**	**ht (ft) (A3)**	**Crown ratio w/o fire (%) (A4)**	**Canopy base height (w/ fire) (A5)**			**Low scorch height (ft) (A6)**	**Litter**	95	16
	w/o fire			**from (ft)**	**to (ft)**	**change (ft)**		**Mineral soil**	0	50
≤ 6	-	5	58	-	-	-	6	**Grass**	0	22
> 6 ≤ 12	2	10	59	-	-	-	12	**Forbs**	0	14
> 12 ≤ 23	4	17	65	-	-	-	23	**Low shrub**	1	7
> 23	8	34	57	-	-	-	3	**Med. shrub**	18	2

Horizontal tree description and burn severity (B)										**Juniper w/ fire (B7)**	
Tree height class (ft) (B1)	**Sp.[1] (B2)**	**Sev.[2] (B3)**	**Ponderosa pine trees/acre (B4)**			**Ponderosa pine volume**					
						total (ft^3/acre) (B5)		**merchantable (ft^3/acre) (B6)**			
	w/ fire		**w/o fire**	**w/ fire**	**change**	**w/o fire**	**w/ fire**	**w/o fire**	**w/ fire**	**present**	**alive (%)**
≤ 6	I	N	288	0	288	0	0	0	0	yes	0
> 6 ≤ 12	I	N	480	0	480	66	0	0	0	yes	0
> 12 ≤ 23	IC	N	576	0	576	437	0	0	0	yes	0
> 23	I	B	288	0	288	1737	0	1116	0	no	-
Total			1632	0	1632	2240	0	1116	0		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

to the North Breaks prescribed fire. This is because we were not able to access this area. For the prescribed fire alone events, we have observations for only five of the six prescribed fires. This is because the Germaine wildfire burned through the entire 6X7W prescribed fire area (fig. 1).

The Data Tables

The structure and burn severity characteristics are described in each data table, which also shows the average cover of soil, litter, and ground level vegetation in burned and unburned sites (tables 2, 3). Tree descriptions are separated into four height classes (≤ 6 ft, > 6 to ≤ 12 ft, > 12 to ≤ 23 ft and > 23 ft). Vertical tree description includes dbh, total height, crown ratio of unburned sites, and low bole scorch. Three canopy base height (cbh) characteristics, cbh without fire (from), cbh with fire (to), and estimated lift (change) in cbh (fig. 3b), are also included. Horizontal tree characteristics consist of descriptors for with and without fire and include trees per acre, total volume (cubic feet per acre), and the merchantable volume (cubic feet per acre) of ponderosa pine. A code for horizontal spacing (uniform, irregular, uniform clumpy, or irregular clumpy) is assigned, based on how trees are grouped (table 3). Estimates of crown scorch are also included and are as follows: no sign of scorch; scorch with most needles green; scorch with most needles brown; scorch with all needles brown; or scorch or consumption without any needles remaining (table 3).

All of the above-mentioned descriptors are for ponderosa pine. However, the presence or absence of Rocky Mountain juniper (*Juniperus scopulorum*) is noted, and when present, the percentage that is alive is given (table 3).

Potential Applications of Handbook

This handbook can be used as a communication tool, a calibration tool, or a monitoring tool. This section provides examples of possible applications. In addition, the techniques and concepts used to develop this handbook can be applied in other locales.

A Communication Tool

A visual illustration of information is one of the most powerful communication tools (Culbertson 1974; Morton 1984; Wagner 1979). The information contained in the tables in this handbook is the result of using forest inventory techniques and direct estimation of burn severity characteristics. This information (provided by the data tables), for both unburned and burned areas, is paired with photographs from the same plot or area where the data were collected. Using photographs as an accompaniment to quantitative characteristics allows the user to focus on specifics in the photographs that are being described in the tables. For example, elements such as canopy base height, ladder fuels, and tree density that can lead to particular severity outcomes can be visually communicated to others through the photographs. For example, the unburned site photograph on page 42 for condition 35 shows a rather dense stand of trees with low canopy base heights, as well as the presence of trees in the ≤ 6 ft height class. A possible severity outcome is pictured to the right, showing 100 percent mortality for all trees ≤ 23 feet tall. The condition illustrated above this (condition 34) shows another fairly dense stand of trees, although with fewer trees per acre, especially for the smallest (≤ 6 ft) height class. The photograph shows considerably more green trees and crowns, and the data table has tree survival in each of the four height classes.

While outcomes will usually vary somewhat, the photographs and data tables can be a useful way to illustrate elements that may lead to particular outcomes.

A Calibration Tool

Information from this handbook can be used to calibrate estimates or as a frame of reference (as we did in this handbook) of tree density, canopy base heights, cover for surface components, and other parameters, as well as burn severity (what is left after the fire) for different conditions within given physiographic positions. After picking a condition for a particular physiographic position and density that is the most similar to a given site, numbers can be adjusted if necessary, depending on if, for example, tree density is higher or lower, a tree height class is not present, or if the percent cover for one of the surface components is lower or higher than what is in the table. One possible way to do this in the field would be to, after selecting the most appropriate condition and recording its number, record in space provided on a data sheet whether a particular component was above or below the number given in the data table. For example, a condition is picked because of its similarity to a site being evaluated after the fire, but the grass cover for the burned site appears to cover a higher percentage of the ground than what is given in the data table. For this, simply write something like "grass + 20 %."

A Monitoring Tool

This handbook can be useful as a monitoring tool when characterizing a burned landscape or a particular fire event. Results that resemble those contained in the handbook can be tallied along a transect (sometimes referred to as a walk-through exam) to get an idea of how much area resulted in various severity outcomes. One way to do this would be to randomly pick a direction (an azimuth to follow using a compass) and distance and after each physiographic change, select the condition that most closely resembles the current site and record its number. Whatever parameter is of interest that is available in the table can be tallied by looking over the selected tables when back in the office. For example, if an objective is to kill a certain percentage of ponderosa pine below six feet tall in a prescribed fire, than the data from the tables for the conditions selected from the handbook can be used to get an idea of how successful this was.

More specifically, a crew might follow a transect that crosses a waterway, a south-facing aspect, a bench, a north-facing aspect, and then another waterway before coming to the end of transect. Afterwards, their data sheet shows that they picked conditions 4 (page 21), 21 (page 33), 48 (page 53), 39 (page 47), and 10 (page 25), respectively. By averaging these conditions (4, 21, 48, 39, and 10), for trees ≤ 6 feet tall, the average trees per acre for unburned sites is 187, while the average for burned sites is 15, yielding a 92 percent change in trees per acre for this height class.

Another way to use this handbook as a monitoring tool is to tally how often a given structure occurs along with or without a particular outcome. For example, take a condition that may occur in waterways such as condition 10 on page 25. Although this site has more medium tree density than other sites shown in the handbook, the photograph and table show 98 percent mortality for trees in all four-height classes. This condition is just one example of where a given physiographic position and forest structure can lead to a particular outcome. Other conditions found in this handbook can also be tallied as they are encountered when following a transect across a burned area. The resulting information would provide proportions

of vegetative structure/burn severity outcomes that occurred within a particular fire event. In addition, this process may identify the proportion of times outcomes provided in the handbook did not occur within a different fire event. In both of these examples, we used this handbook as a tool to get quick estimates when time and money were limiting factors. It is important to remember that this is a method to provide estimates and is not a substitute for installing plots and quantifying vegetation, litter, and burn severity.

Factors to Consider

The value of information obtained by using this handbook depends on the user's objectives and how to account for bias, precision, and accuracy in the estimates. Understanding these data characteristics increases the likelihood that information obtained using this handbook will provide relevant descriptions of forested landscapes. Bias describes whether measurements are consistently above or below the true value. For example, the diameters of several trees are measured in a group of trees that are all known to be 5.0 inches in diameter. When looking at the measured diameter for each tree, it is noticed that all the measurements are around 4.0 inches. This value of 1.0 inch consistently below the actual diameter reflects a bias. Precision refers to how exact an estimate or measurement is and if it can be repeated. For example, when multiple measurements of a tree with a true diameter of 4.6 yields values ranging from 4.0 to 5.0 inches, precision may be considered low. On the other hand, with values ranging from 4.5 to 4.7 inches, precision may be considered high. An accurate measurement reflects the combination of both precision and lack of bias, similar to hitting close to the bullseye on a target, instead of having all the shots in one corner of the target (bias) or scattered all over the target (low precision) (Ratti and Garton 1994). Considering the bullseye analogy, it is important when collecting data to decide how big the bullseye should be or what percentage of error is acceptable. Will diameters be taken to the nearest inch or to the nearest tenth of an inch? On trees should heights be measured to the nearest tenth of a foot or to the nearest foot? After considering the factors mentioned above, take as many samples as time and money allows, since multiple samples taken in a particular locale increase the likelihood that individual samples will increase accuracy. To ensure information obtained through the use of this handbook is accurate, consider the following suggestions.

1. Use the same physiographic positions within a region similar to the one described in this handbook.
2. Use the same height classes used in this handbook when characterizing trees.
3. Take a sub-sample of data on a few plots (use the same plot design as used in the handbook) to ensure the site being characterized reflects forest conditions similar to those characterized in this handbook.
4. Estimate the substrate (litter, mineral soil, grass, forbs, and shrubs) in both unburned and burned areas directly in the field, at least initially, as an aid towards validation of the surface characteristics in this handbook. This is suggested because several factors can influence surface cover, such as livestock grazing, annual precipitation, and other weather variables, which may be unique for any given year (Biswell 1972). If the measurements taken in the field do not match the handbook, it may be more appropriate to actually estimate surface cover, rather than accepting the values in the table. This decision depends upon the objective and the use of the assessment.

5. Obtain as many observations as possible, since this will often increase accuracy. This is important when working in areas where characteristics such as stand density can often vary considerably. However, since time, affordability, travel distance, or a combination of these can be limiting factors, a minimum of three observations may suffice for any given physical condition and density combination.

6. There may be times when three stories are present in the stand being evaluated, yet a fourth story is described in the handbook. In this case, we suggest that the missing story be removed from the quantitative measurements documented in the handbook in order to improve the field estimate.

Handbook Strengths

This unique photograph handbook (we are unaware of a similar presentation) provides a snapshot of changes in forested or grassland conditions after fire events and, as stated earlier, can be used as a communication, calibration, or monitoring tool. For situations where it is impractical or overly time-consuming to characterize structural characteristics and burn severity using strict quantitative methods, this handbook can be useful for providing quick estimates.

Handbook Limitations

Throughout the areas we studied, Rocky Mountain juniper was an incidental species. In some cases, the unburned sites did not have juniper, while some burned sites with similar physiographic position and tree density had juniper present. Because the occurrence of this species was limited, estimates are for ponderosa pine only.

Since we developed a sampling design to ensure that we accounted for variation across different landscape positions and forest conditions, we do not have a specific plot or transect design that includes plot size when quantifying change in the post-fire environment. The photographs and associated data in this handbook for unburned and burned sites are not from the same site; these are not pre- and post-fire sites. Rather, we used the unburned sites as a frame of reference to estimate changes and resulting vegetative characteristic at the burned sites.

Because areas across landscapes are not repetitive sets of features, some unburned photographs do not appear to look similar to the burned photographs. Therefore some matches are better than others, and finding perfect matches is nearly impossible. Given this variability, we focused on specific elements for similarity measures such as tree density by the four height classes, while using broad definitions of physiographic positions.

Although this handbook depicts outcomes that can result from fires, we do not attempt to state why a particular outcome occurred. This is because we do not have any information (for example, specific weather at the time the site burned) to support inferences as to why one outcome occurred versus another. Interactions among fuels, weather, and physical setting influence fire behavior and severity. This handbook emphasizes, through diverse outcomes, the importance of considering a combination of factors and not just fuels. As a communication tool, this handbook provides a series of outcomes so fire managers and scientists can hypothesize what factors may have influenced a particular result.

A shortcoming of this technique is the lack of detailed plots in the burned areas. However, in exchange for this lack of information, we

maximized the amount of area sampled and the number of samples, given our limited time period and funding. Although more time and money would have provided an opportunity to conduct a detailed post-fire inventory, it was not an option in this case. Given the circumstances, our goal was to maintain some statistical rigor (incorporate randomness, repeatability, established sampling techniques) and do our best to minimize bias and partiality in our characterization. The frame of reference does not reflect vegetation characteristics created from historical fire regimes, nor is it a "reference condition" or a reflection of the "historical range of variability" often used to provide management direction or quantify change (Hann and others 1997; Hann and Bunnel 2001; Morgan and others 1994; USDI 1979). Rather, this frame of reference provides a baseline (Kaufmann and others 1994) of today's forested and grassland characteristics that occur in places within the Missouri River Breaks. Although this approach is not ideal, and may not be a preferred method to use in other circumstances, it does provide a quantifiable and repeatable technique for identifying variation in post-fire environments caused by different fire events. Although this handbook can serve as a less time-consuming way to evaluate fire prescriptions, aid in monitoring, and provide information to aid with fuel treatment decisions, a clear understanding of its limitations is important prior to using this handbook.

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Waterways (wildfire alone)

Unburned

Germaine surrounding 6X7W

Unburned

Germaine surrounding HCross

Unburned

Indian surrounding South Breaks 1

Waterways

Condition 1: Germaine wildfire, surrounding prescribed fire 6X7W

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	10	3
								Mineral soil	90	65
≤ 6	-	3	92	0	0	0	-	Grass	40	20
> 6 ≤ 12	2	9	90	1	1	0	-	Forbs	10	3
> 12 ≤ 23	3	23	70	7	7	0	-	Low shrub	25	4
> 23	4	25	80	5	5	0	-	Med. shrub	8	6

Horizontal tree description and burn severity											
			Ponderosa pine trees/acre			Ponderosa pine volume				Juniper w/ fire	
	Sp.[1]	Sev.[2]				total (ft^3/acre)		merchantable (ft^3/acre)			
Tree height class (ft)	w/ fire		w/o fire	w/ fire	change	w/o fire	w/ fire	w/o fire	w/ fire	present	alive (%)
≤ 6	I	U	360	360	0	0	0	0	0	no	-
> 6 ≤ 12	I	U	48	48	0	5	5	0	0	yes	0
> 12 ≤ 23	I	U	24	24	0	17	17	0	0	yes	0
> 23	I	U	24	24	0	29	29	0	0	no	-
Total			456	456	0	51	51	0	0		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 2: Germaine wildfire, surrounding prescribed fire HCross

Slope: > 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	20	10
								Mineral soil	80	85
≤ 6	-	3	75	-	-	-	3	Grass	10	2
> 6 ≤ 12	2	9	73	-	-	-	12	Forbs	5	4
> 12 ≤ 23	2	13	80	-	-	-	23	Low shrub	10	3
> 23	6	25	70	-	-	-	38	Med. shrub	12	5

Horizontal tree description and burn severity											
			Ponderosa pine trees/acre			Ponderosa pine volume				Juniper w/ fire	
	Sp.[1]	Sev.[2]				total (ft^3/acre)		merchantable (ft^3/acre)			
Tree height class (ft)	w/ fire		w/o fire	w/ fire	change	w/o fire	w/ fire	w/o fire	w/ fire	present	alive (%)
≤ 6	IC	B	264	0	264	0	0	0	0	no	-
> 6 ≤ 12	IC	B	48	0	48	5	0	0	0	no	-
> 12 ≤ 23	I	B	24	0	24	5	0	0	0	no	-
> 23	I	B	48	0	48	99	0	0	0	no	-
Total			384	0	384	109	0	0	0		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 3: Indian wildfire, surrounding prescribed fire South Breaks 1

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	60	4
								Mineral soil	27	32
≤ 6	-	3	6	-	-	-	6	Grass	10	60
> 6 ≤ 12	2	11	70	1	3	2	3	Forbs	1	28
> 12 ≤ 23	4	16	60	1	7	6	9	Low shrub	3	5
> 23	6	29	70	7	25	18	12	Med. shrub	0	3

Horizontal tree description and burn severity											
			Ponderosa pine trees/acre			Ponderosa pine volume				Juniper w/ fire	
	Sp.[1]	Sev.[2]				total (ft^3/acre)		merchantable (ft^3/acre)			
Tree height class (ft)	w/ fire		w/o fire	w/ fire	change	w/o fire	w/ fire	w/o fire	w/ fire	present	alive (%)
≤ 6	I	B	48	0	48	0	0	0	0	no	-
> 6 ≤ 12	I	MB	72	4	68	15	1	0	0	yes	5
> 12 ≤ 23	I	MB	48	2	46	38	2	0	0	yes	5
> 23	I	MB	48	14	34	129	39	55	17	no	-
Total			216	20	196	182	42	55	17		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Waterways (prescribed fire alone)

Unburned

North Breaks

Condition 4: Prescribed fire North Breaks

Slope: ≤25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	50	50
								Mineral soil	11	50
≤ 6	-	2	64	1	3	2	1	Grass	35	30
> 6 ≤ 12	2	9	73	2	5	3	1	Forbs	2	20
> 12 ≤ 23	4	14	75	5	10	5	2	Low shrub	25	25
> 23	10	40	75	15	20	5	2	Med. shrub	0	0

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft³/acre) w/o fire	w/ fire	merchantable (ft³/acre) w/o fire	w/ fire	present	alive (%)
≤ 6	IC	MB	504	50	454	0	0	0	0	yes	0
> 6 ≤ 12	IC	MB	72	29	43	10	4	0	0	no	-
> 12 ≤ 23	IC	MB	24	10	14	12	5	0	0	yes	0
> 23	IC	MG	69	41	28	686	412	498	299	no	-
Total			669	130	539	708	421	498	299		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Waterways (prescribed fire alone)

Unburned

South Breaks 1

Unburned

South Breaks 2

Unburned

South Breaks 3

Waterways

Condition 5: Prescribed fire South Breaks 1

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	20	20
								Mineral soil	80	9
≤ 6	-	3	75	0	2	2	1	Grass	10	64
> 6 ≤ 12	2	9	73	3	5	2	1	Forbs	5	6
> 12 ≤ 23	2	13	80	3	5	2	1	Low shrub	10	12
> 23	6	25	70	5	10	5	1	Med. shrub	12	12

Horizontal tree description and burn severity											
			Ponderosa pine trees/acre			Ponderosa pine volume				Juniper w/ fire	
						total (ft^3/acre)		merchantable (ft^3/acre)			
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	w/o fire	w/ fire	change	w/o fire	w/ fire	w/o fire	w/ fire	present	alive (%)
≤ 6	IC	MG	264	198	66	0	0	0	0	no	-
> 6 ≤ 12	IC	MB	48	24	24	5	3	0	0	yes	0
> 12 ≤ 23	IC	MB	24	12	12	5	3	0	0	no	-
> 23	I	MG	48	48	0	99	99	0	0	no	-
Total			384	282	102	109	105	0	0		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 6: Prescribed fire South Breaks 2

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	5	5
								Mineral soil	20	30
≤ 6								Grass	40	75
> 6 ≤ 12			No trees					Forbs	40	10
> 12 ≤ 23								Low shrub	9	15
> 23								Med. shrub	0	50

Horizontal tree description and burn severity											
			Ponderosa pine trees/acre			Ponderosa pine volume				Juniper w/ fire	
						total (ft^3/acre)		merchantable (ft^3/acre)			
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	w/o fire	w/ fire	change	w/o fire	w/ fire	w/o fire	w/ fire	present	alive (%)
≤ 6										no	-
> 6 ≤ 12			No trees							no	-
> 12 ≤ 23										no	-
> 23										no	-
Total											

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 7: Prescribed fire South Breaks 3

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	10	10
								Mineral soil	90	90
≤ 6	-	3	92	0	0	0	1	Grass	40	80
> 6 ≤ 12	-	-	-	-	-	-	-	Forbs	10	3
> 12 ≤ 23	-	-	-	-	-	-	-	Low shrub	25	4
> 23	-	-	-	-	-	-	-	Med. shrub	8	6

Horizontal tree description and burn severity											
			Ponderosa pine trees/acre			Ponderosa pine volume				Juniper w/ fire	
						total (ft^3/acre)		merchantable (ft^3/acre)			
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	w/o fire	w/ fire	change	w/o fire	w/ fire	w/o fire	w/ fire	present	alive (%)
≤ 6	IC	MB	360	90	270	0	0	0	0	yes	0
> 6 ≤ 12	-	-	0	0	-	0	0	0	0	yes	0
> 12 ≤ 23	-	-	0	0	-	0	0	0	0	no	-
> 23	-	-	0	0	-	0	0	0	0	no	-
Total			360	90	270	0	0	0	0		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Waterways (prescribed fire followed by wildfire)

Unburned

6X7W followed by Germaine

Unburned

HCross followed by Germaine

Unburned

North Breaks followed by Indian

Waterways

Condition 8: Site where the Germaine wildfire burned through prescribed fire 6X7W

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	50	40
								Mineral soil	11	40
≤ 6	-	2	64	0	0	0	1	Grass	35	30
> 6 ≤ 12	2	9	73	0	0	0	1	Forbs	2	15
> 12 ≤ 23	4	14	75	3	6	3	1	Low shrub	25	50
> 23	10	40	75	5	16	11	1	Med. shrub	0	10

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	Ponderosa pine trees/acre w/ fire	Ponderosa pine trees/acre change	Ponderosa pine volume total (ft³/acre) w/o fire	Ponderosa pine volume total (ft³/acre) w/ fire	Ponderosa pine volume merchantable (ft³/acre) w/o fire	Ponderosa pine volume merchantable (ft³/acre) w/ fire	present	alive (%)
≤ 6	IC	MB	504	353	151	0	0	0	0	yes	70
> 6 ≤ 12	IC	MG	72	36	36	10	5	0	0	yes	50
> 12 ≤ 23	IC	MG	24	23	1	12	11	0	0	no	-
> 23	I	MG	69	69	0	686	686	498	498	no	-
Total			669	481	188	708	702	498	498		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 9: Site where the Germaine wildfire burned through prescribed fire HCross

Slope: > 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	10	30
								Mineral soil	90	50
≤ 6	-	3	92	1	3	2	1	Grass	40	15
> 6 ≤ 12	2	9	90	0	0	0	1	Forbs	10	5
> 12 ≤ 23	3	23	70	0	0	0	2	Low shrub	25	10
> 23	4	25	80	-	-	-	15	Med. shrub	8	15

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	Ponderosa pine trees/acre w/ fire	Ponderosa pine trees/acre change	Ponderosa pine volume total (ft³/acre) w/o fire	Ponderosa pine volume total (ft³/acre) w/ fire	Ponderosa pine volume merchantable (ft³/acre) w/o fire	Ponderosa pine volume merchantable (ft³/acre) w/ fire	present	alive (%)
≤ 6	IC	MG	360	108	252	0	0	0	0	no	-
> 6 ≤ 12	IC	MG	48	19	29	5	2	0	0	no	-
> 12 ≤ 23	I	MB	24	14	10	17	10	0	0	yes	50
> 23	I	B	24	0	24	29	0	0	0	no	-
Total			456	141	315	51	12	0	0		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 10: Site where the Indian wildfire burned through prescribed fire North Breaks

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	95	10
								Mineral soil	6	87
≤ 6	-	4	63	-	-	-	6	Grass	4	7
> 6 ≤ 12	-	-	-	-	-	-	-	Forbs	1	5
> 12 ≤ 23	4	20	53	-	-	-	23	Low shrub	25	7
> 23	9	42	66	9	34	25	36	Med. shrub	0	0

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	Ponderosa pine trees/acre w/ fire	Ponderosa pine trees/acre change	Ponderosa pine volume total (ft³/acre) w/o fire	Ponderosa pine volume total (ft³/acre) w/ fire	Ponderosa pine volume merchantable (ft³/acre) w/o fire	Ponderosa pine volume merchantable (ft³/acre) w/ fire	present	alive (%)
≤ 6	IC	N	72	0	72	2	0	0	0	yes	0
> 6 ≤ 12	-	-	0	0	-	0	0	0	0	yes	0
> 12 ≤ 23	I	N	72	0	72	50	0	0	0	yes	0
> 23	I	MB	165	7	158	1398	56	1030	41	no	-
Total			309	7	302	1450	56	1030	41		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Waterways (prescribed fire followed by wildfire)

Unburned

South Breaks 1 followed by Indian

Unburned

South Breaks 2 followed by Indian

Unburned

South Breaks 3 followed by Indian

Waterways

Condition 11: Site where the Indian wildfire burned through prescribed fire South Breaks 1

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	60	3
								Mineral soil	27	50
≤ 6	-	3	6	2	3	1	0	Grass	10	20
> 6 ≤ 12	2	11	70	2	2	0	0	Forbs	1	5
> 12 ≤ 23	4	16	60	3	9	6	1	Low shrub	3	3
> 23	6	29	70	6	6	0	0	Med. shrub	0	7

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft³/acre) w/o fire	w/ fire	merchantable (ft³/acre) w/o fire	w/ fire	present	alive (%)
≤ 6	I	U	48	48	0	0	0	0	0	yes	100
> 6 ≤ 12	IC	MG	72	65	7	15	14	0	0	yes	100
> 12 ≤ 23	I	MG	48	48	0	38	38	0	0	no	-
> 23	I	U	48	48	0	129	129	55	55	no	-
Total			216	209	7	182	181	55	55		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 12: Site where the Indian wildfire burned through prescribed fire South Breaks 2

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	10	10
								Mineral soil	90	10
≤ 6	-	3	92	0	0	0	3	Grass	40	72
> 6 ≤ 12	2	9	90	3	5	2	1	Forbs	10	37
> 12 ≤ 23	3	23	70	9	11	2	3	Low shrub	25	10
> 23	4	25	80	15	20	5	6	Med. shrub	8	4

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft³/acre) w/o fire	w/ fire	merchantable (ft³/acre) w/o fire	w/ fire	present	alive (%)
≤ 6	I	MB	360	36	324	0	0	0	0	yes	0
> 6 ≤ 12	I	MG	48	48	0	5	5	0	0	yes	0
> 12 ≤ 23	I	MB	24	10	14	17	7	0	0	yes	0
> 23	I	MB	24	12	12	29	15	0	0	no	-
Total			456	106	350	51	27	0	0		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 13: Site where the Indian wildfire burned through prescribed fire South Breaks 3

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	20	12
								Mineral soil	80	35
≤ 6	-	3	75	1	2	1	2	Grass	10	40
> 6 ≤ 12	2	9	73	4	5	1	2	Forbs	5	22
> 12 ≤ 23	2	13	80	4	8	4	2	Low shrub	10	20
> 23	6	25	70	10	14	4	3	Med. shrub	12	8

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft³/acre) w/o fire	w/ fire	merchantable (ft³/acre) w/o fire	w/ fire	present	alive (%)
≤ 6	IC	MG	264	198	66	0	0	0	0	yes	0
> 6 ≤ 12	IC	MG	48	12	36	5	1	0	0	yes	20
> 12 ≤ 23	I	MG	24	19	5	5	4	0	0	no	-
> 23	I	MG	48	48	0	99	99	0	0	no	-
Total			384	277	107	109	104	0	0		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

South-facing aspects (wildfire alone)

Unburned

Germaine surrounding 6X7W

Unburned

Germaine surrounding HCross

Unburned

Germaine surrounding South Breaks 3

South-facing aspects

Condition 14: Germaine wildfire, surrounding prescribed fire 6X7W

Slope: > 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	45	10
								Mineral soil	15	45
≤ 6	-	-	-	-	-	-	-	Grass	35	40
> 6 ≤ 12	3	9	50	-	-	-	2	Forbs	2	4
> 12 ≤ 23	7	18	53	3	12	9	2	Low shrub	5	5
> 23	13	32	88	3	20	17	2	Med. shrub	0	2

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft³/acre) w/o fire	w/ fire	merchantable (ft³/acre) w/o fire	w/ fire	present	alive (%)
≤ 6	-	-	0	0	-	0	0	0	0	no	-
> 6 ≤ 12	I	B	24	0	24	7	0	0	0	no	-
> 12 ≤ 23	IC	MB	72	18	54	177	44	84	21	no	-
> 23	IC	MB	44	22	22	516	258	396	198	no	-
Total			140	40	100	700	302	480	219		

[1]**Spacing (Sp.)**: U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity (Sev.)**: U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 15: Germaine wildfire, surrounding prescribed fire HCross

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	2	10
								Mineral soil	46	30
≤ 6	-	2	100	-	-	-	2	Grass	65	70
> 6 ≤ 12	2	9	100	1	5	4	5	Forbs	2	3
> 12 ≤ 23	-	-	-	-	-	-	-	Low shrub	1	5
> 23	-	-	-	-	-	-	-	Med. shrub	20	10

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft³/acre) w/o fire	w/ fire	merchantable (ft³/acre) w/o fire	w/ fire	present	alive (%)
≤ 6	IC	B	24	0	24	0	0	0	0	no	-
> 6 ≤ 12	IC	MB	96	58	38	12	7	0	0	no	-
> 12 ≤ 23	-	-	0	0	-	0	0	0	0	no	-
> 23	-	-	0	0	-	0	0	0	0	no	-
Total			120	58	62	12	7	0	0		

[1]**Spacing (Sp.)**: U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity (Sev.)**: U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 16: Germaine wildfire, surrounding prescribed fire South Breaks 3

Slope: > 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	2	6
								Mineral soil	95	50
≤ 6	-	5	43	-	-	-	2	Grass	15	85
> 6 ≤ 12	2	8	50	2	3	1	2	Forbs	0	3
> 12 ≤ 23	3	18	64	3	4	1	4	Low shrub	2	3
> 23	10	35	64	-	-	-	15	Med. shrub	0	5

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft³/acre) w/o fire	w/ fire	merchantable (ft³/acre) w/o fire	w/ fire	present	alive (%)
≤ 6	I	B	168	0	168	5	0	0	0	no	-
> 6 ≤ 12	I	MB	24	19	5	2	2	0	0	no	-
> 12 ≤ 23	U	MB	168	84	84	101	51	0	0	no	-
> 23	U	B	104	0	104	751	0	524	0	no	-
Total			464	103	361	859	53	524	0		

[1]**Spacing (Sp.)**: U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity (Sev.)**: U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

South-facing aspects (prescribed fire alone)

Unburned

HCross

Unburned

North Breaks

South-facing aspects

Condition 17: Prescribed fire HCross

Slope: > 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	45	20
≤ 6	-	-	-	-	-	-	-	Mineral soil	15	30
> 6 ≤ 12	3	9	50	3	5	2	3	Grass	35	50
> 12 ≤ 23	7	18	53	3	6	3	3	Forbs	2	3
> 23	13	32	88	-	-	-	8	Low shrub	5	10
								Med. shrub	0	10

Horizontal tree description and burn severity											
			Ponderosa pine trees/acre			Ponderosa pine volume				Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire				total (ft³/acre)		merchantable (ft³/acre)			
			w/o fire	w/ fire	change	w/o fire	w/ fire	w/o fire	w/ fire	present	alive (%)
≤ 6	-	-	0	0	-	0	0	0	0	no	-
> 6 ≤ 12	IC	MB	24	10	14	7	3	0	0	no	-
> 12 ≤ 23	I	MB	72	36	36	177	89	84	42	no	-
> 23	U	B	44	0	44	516	0	396	0	no	-
Total			140	46	94	700	92	480	42		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 18: Prescribed fire North Breaks

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	80	2
≤ 6	-	-	-	-	-	-	-	Mineral soil	5	67
> 6 ≤ 12	3	10	88	-	-	-	12	Grass	25	20
> 12 ≤ 23	6	18	70	2	8	6	23	Forbs	0	6
> 23	12	34	76	7	13	6	3	Low shrub	2	2
								Med. shrub	1	10

Horizontal tree description and burn severity											
			Ponderosa pine trees/acre			Ponderosa pine volume				Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire				total (ft³/acre)		merchantable (ft³/acre)			
			w/o fire	w/ fire	change	w/o fire	w/ fire	w/o fire	w/ fire	present	alive (%)
≤ 6	-	-	0	0	-	0	0	0	0	yes	50
> 6 ≤ 12	IC	B	24	0	24	7	0	0	0	yes	0
> 12 ≤ 23	IC	MG	72	32	40	130	59	43	19	no	-
> 23	I	MG	67	3	64	681	34	522	26	no	-
Total			163	35	128	818	93	565	45		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

South-facing aspects (prescribed fire alone)

Unburned

South Breaks 1

Unburned

South Breaks 2

Unburned

South Breaks 3

South-facing aspects

Condition 19: Prescribed fire South Breaks 1

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	2	15
								Mineral soil	46	40
≤ 6	-	2	100	0	2	2	1	Grass	65	60
> 6 ≤ 12	2	9	100	0	3	3	1	Forbs	2	3
> 12 ≤ 23	-	-	-	-	-	-	-	Low shrub	1	4
> 23	-	-	-	-	-	-	-	Med. shrub	20	6

Horizontal tree description and burn severity										Juniper w/ fire	
			Ponderosa pine trees/acre			Ponderosa pine volume					
						total (ft^3/acre)		merchantable (ft^3/acre)			
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	w/o fire	w/ fire	change	w/o fire	w/ fire	w/o fire	w/ fire	present	alive (%)
≤ 6	I	MG	24	10	14	0	0	0	0	no	-
> 6 ≤ 12	I	MG	96	58	38	12	7	0	0	yes	0
> 12 ≤ 23	-	-	0	0	-	0	0	0	0	no	-
> 23	-	-	0	0	-	0	0	0	0	no	-
Total			120	68	52	12	7	0	0		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 20: Prescribed fire South Breaks 2

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	60	2
								Mineral soil	20	60
≤ 6	-	3	98	1	3	2	1	Grass	18	40
> 6 ≤ 12	3	10	84	2	4	2	1	Forbs	0	8
> 12 ≤ 23	9	21	95	4	6	2	3	Low shrub	5	1
> 23	-	-	-	-	-	-	-	Med. shrub	5	6

Horizontal tree description and burn severity										Juniper w/ fire	
			Ponderosa pine trees/acre			Ponderosa pine volume					
						total (ft^3/acre)		merchantable (ft^3/acre)			
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	w/o fire	w/ fire	change	w/o fire	w/ fire	w/o fire	w/ fire	present	alive (%)
≤ 6	I	MB	72	18	54	0	0	0	0	no	-
> 6 ≤ 12	I	MG	72	54	18	29	22	0	0	yes	0
> 12 ≤ 23	I	MG	48	36	12	223	167	139	104	no	-
> 23	-	-	0	0	-	0	0	0	0	no	-
Total			192	108	84	252	189	139	104		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 21: Prescribed fire South Breaks 3

Slope: > 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	2	20
								Mineral soil	95	27
≤ 6	-	5	43	-	-	-	3	Grass	15	60
> 6 ≤ 12	2	8	50	6	7	1	1	Forbs	0	2
> 12 ≤ 23	3	18	64	5	8	3	2	Low shrub	2	4
> 23	10	35	64	6	10	4	3	Med. shrub	0	1

Horizontal tree description and burn severity										Juniper w/ fire	
			Ponderosa pine trees/acre			Ponderosa pine volume					
						total (ft^3/acre)		merchantable (ft^3/acre)			
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	w/o fire	w/ fire	change	w/o fire	w/ fire	w/o fire	w/ fire	present	alive (%)
≤ 6	I	B	168	0	168	5	0	0	0	no	-
> 6 ≤ 12	I	MB	24	18	6	2	2	0	0	no	-
> 12 ≤ 23	I	MG	168	151	17	101	91	0	0	no	-
> 23	I	MG	104	104	0	751	751	524	524	no	-
Total			464	273	191	859	844	524	524		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

South-facing aspects (prescribed fire followed by wildfire)

Unburned

6X7W followed by Germaine

Unburned

HCross followed by Germaine

Unburned

North Breaks followed by Indian

South-facing aspects

Condition 22: Site where the Germaine wildfire burned through prescribed fire 6X7W

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	60	3
								Mineral soil	20	25
≤ 6	-	3	98	-	-	-	1	Grass	18	65
> 6 ≤ 12	3	10	84	-	-	-	4	Forbs	0	3
> 12 ≤23	9	21	95	-	-	-	7	Low shrub	5	2
> 23	-	-	-	-	-	-	-	Med. shrub	5	1

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	Ponderosa pine trees/acre w/ fire	Ponderosa pine trees/acre change	Ponderosa pine volume total (ft^3/acre) w/o fire	Ponderosa pine volume total (ft^3/acre) w/ fire	Ponderosa pine volume merchantable (ft^3/acre) w/o fire	Ponderosa pine volume merchantable (ft^3/acre) w/ fire	present	alive (%)
≤ 6	IC	B	72	0	72	0	0	0	0	no	-
> 6 ≤ 12	I	B	72	0	72	29	0	0	0	no	-
> 12 ≤ 23	I	B	48	0	48	223	223	139	139	no	-
> 23	-	-	0	0	-	0	0	0	0	no	-
Total			192	0	192	252	223	139	139		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 23: Site where the Germaine wildfire burned through prescribed fire HCross

Slope: > 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	45	60
								Mineral soil	15	30
≤ 6	-	-	-	-	-	-	-	Grass	35	10
> 6 ≤ 12	3	9	50	-	-	-	3	Forbs	2	5
> 12 ≤ 23	7	18	53	4	8	4	2	Low shrub	5	3
> 23	-	-	-	-	-	-	-	Med. shrub	0	5

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	Ponderosa pine trees/acre w/ fire	Ponderosa pine trees/acre change	Ponderosa pine volume total (ft^3/acre) w/o fire	Ponderosa pine volume total (ft^3/acre) w/ fire	Ponderosa pine volume merchantable (ft^3/acre) w/o fire	Ponderosa pine volume merchantable (ft^3/acre) w/ fire	present	alive (%)
≤ 6	-	-	0	0	-	0	0	0	0	no	-
> 6 ≤ 12	IC	B	24	0	24	7	0	0	0	no	-
> 12 ≤ 23	IC	MG	72	43	29	177	106	84	50	no	-
> 23	-	-	0	0	-	0	0	0	0	no	-
Total			96	43	53	184	106	84	50		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 24: Site where the Indian wildfire burned through prescribed fire North Breaks

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	60	10
								Mineral soil	20	70
≤ 6	-	3	98	-	-	-	2	Grass	18	50
> 6 ≤ 12	3	10	84	1	5	4	1	Forbs	0	10
> 12 ≤ 23	9	21	95	4	7	3	5	Low shrub	5	2
> 23	-	-	-	-	-	-	-	Med. shrub	5	2

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	Ponderosa pine trees/acre w/ fire	Ponderosa pine trees/acre change	Ponderosa pine volume total (ft^3/acre) w/o fire	Ponderosa pine volume total (ft^3/acre) w/ fire	Ponderosa pine volume merchantable (ft^3/acre) w/o fire	Ponderosa pine volume merchantable (ft^3/acre) w/ fire	present	alive (%)
≤ 6	I	B	72	0	72	0	0	0	0	yes	0
> 6 ≤ 12	IC	MG	72	47	25	29	19	0	0	no	-
> 12 ≤ 23	I	MB	48	12	36	223	56	139	35	no	-
> 23	-	-	0	0	-	0	0	0	0	no	-
Total			192	59	133	252	75	139	35		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

South-facing aspects (prescribed fire followed by wildfire)

Unburned

South Breaks 1 followed by Indian

Unburned

South Breaks 2 followed by Indian

Unburned

South Breaks 3 followed by Indian

South-facing aspects

Condition 25: Site where the Indian wildfire burned through prescribed fire South Breaks 1

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	80	2
≤ 6	-	-	-	-	-	-	-	Mineral soil	5	85
> 6 ≤ 12	3	10	88	2	4	2	1	Grass	25	20
> 12 ≤ 23	6	18	70	2	4	2	1	Forbs	0	15
> 23	12	34	76	4	7	3	1	Low shrub	2	2
								Med. shrub	1	13

Horizontal tree description and burn severity											
			Ponderosa pine trees/acre			Ponderosa pine volume				Juniper w/ fire	
						total (ft^3/acre)		merchantable (ft^3/acre)			
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	w/o fire	w/ fire	change	w/o fire	w/ fire	w/o fire	w/ fire	present	alive (%)
≤ 6	-	-	0	0	-	0	0	0	0	no	-
> 6 ≤ 12	I	MG	24	22	2	7	7	0	0	yes	0
> 12 ≤ 23	I	MG	72	65	7	130	117	43	39	no	-
> 23	I	MG	67	45	22	681	456	522	350	no	-
Total			163	132	31	818	580	565	389		

[1]**Spacing (Sp.)**: U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity (Sev.)**: U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 26: Site where the Indian wildfire burned through prescribed fire South Breaks 2

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	95	75
≤ 6	-	3	40	2	2	0	2	Mineral soil	0	15
> 6 ≤ 12	3	10	81	2	2	0	2	Grass	1	12
> 12 ≤ 23	5	18	68	5	5	0	2	Forbs	0	15
> 23	8	30	50	6	12	6	2	Low shrub	0	3
								Med. shrub	0	2

Horizontal tree description and burn severity											
			Ponderosa pine trees/acre			Ponderosa pine volume				Juniper w/ fire	
						total (ft^3/acre)		merchantable (ft^3/acre)			
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	w/o fire	w/ fire	change	w/o fire	w/ fire	w/o fire	w/ fire	present	alive (%)
≤ 6	IC	MB	216	11	205	0	0	0	0	no	-
> 6 ≤ 12	IC	MB	144	36	108	34	9	0	0	yes	25
> 12 ≤ 23	I	MB	144	72	72	199	100	34	17	no	-
> 23	I	MG	456	433	23	1935	1838	1104	1049	no	-
Total			960	552	408	2168	1947	1138	1066		

[1]**Spacing (Sp.)**: U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity (Sev.)**: U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 27: Site where the Indian wildfire burned through prescribed fire South Breaks 3

Slope: > 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	2	5
≤ 6	-	5	43	0	2	2	1	Mineral soil	95	80
> 6 ≤ 12	2	8	50	2	5	3	1	Grass	15	25
> 12 ≤ 23	3	18	64	5	8	3	2	Forbs	0	2
> 23	10	35	64	3	7	4	2	Low shrub	2	5
								Med. shrub	0	2

Horizontal tree description and burn severity											
			Ponderosa pine trees/acre			Ponderosa pine volume				Juniper w/ fire	
						total (ft^3/acre)		merchantable (ft^3/acre)			
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	w/o fire	w/ fire	change	w/o fire	w/ fire	w/o fire	w/ fire	present	alive (%)
≤ 6	I	MB	168	84	84	5	3	0	0	yes	0
> 6 ≤ 12	IC	MG	24	19	5	2	2	0	0	yes	0
> 12 ≤ 23	I	MB	168	57	111	101	34	0	0	no	-
> 23	I	MB	104	78	26	751	563	524	393	no	-
Total			464	238	226	859	602	524	393		

[1]**Spacing (Sp.)**: U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity (Sev.)**: U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

North-facing aspects (wildfire alone)

Unburned

Germaine surrounding 6X7W

Unburned

Germaine surrounding HCross

Unburned

Germaine surrounding South Breaks 3

North-facing aspects

Condition 28: Germaine wildfire, surrounding prescribed fire 6X7W

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	1	1
								Mineral soil	55	90
≤ 6	-	4	79	-	-	-	6	Grass	40	20
> 6 ≤ 12	2	7	100	-	-	-	12	Forbs	1	5
> 12 ≤ 23	8	21	75	3	18	15	3	Low shrub	6	50
> 23	-	-	-	-	-	-	-	Med. shrub	4	0

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft³/acre) w/o fire	w/ fire	merchantable (ft³/acre) w/o fire	w/ fire	present	alive (%)
≤ 6	IC	B	120	0	120	0	0	0	0	no	-
> 6 ≤ 12	IC	B	24	0	24	2	0	0	0	no	-
> 12 ≤ 23	I	MB	24	2	22	82	8	43	4	no	-
> 23	-	-	0	0	-	0	0	0	0	no	-
Total			168	2	166	84	8	43	4		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 29: Germaine wildfire, surrounding prescribed fire HCross

Slope: > 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	85	20
								Mineral soil	11	30
≤ 6	-	4	83	-	-	-	5	Grass	4	50
> 6 ≤ 12	1	11	70	-	-	-	7	Forbs	1	15
> 12 ≤ 23	4	21	71	-	-	-	6	Low shrub	5	5
> 23	6	28	66	6	10	4	10	Med. shrub	29	15

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft³/acre) w/o fire	w/ fire	merchantable (ft³/acre) w/o fire	w/ fire	present	alive (%)
≤ 6	IC	B	168	0	168	0	0	0	0	no	-
> 6 ≤ 12	I	B	96	0	96	7	0	0	0	no	-
> 12 ≤ 23	I	B	264	0	264	271	0	0	0	no	-
> 23	I	MB	240	24	216	604	60	197	20	no	-
Total			768	24	744	882	60	197	20		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 30: Germaine wildfire, surrounding prescribed fire South Breaks 3

Slope: > 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	5	70
								Mineral soil	61	75
≤ 6	-	4	74	2	4	2	3	Grass	37	30
> 6 ≤ 12	2	8	74	3	7	4	7	Forbs	2	45
> 12 ≤ 23	4	16	76	5	14	9	9	Low shrub	2	35
> 23	8	29	75	10	19	9	10	Med. shrub	14	1

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft³/acre) w/o fire	w/ fire	merchantable (ft³/acre) w/o fire	w/ fire	present	alive (%)
≤ 6	IC	MB	408	20	388	2	0	0	0	no	-
> 6 ≤ 12	I	MB	192	38	154	18	4	0	0	no	-
> 12 ≤ 23	IC	MB	192	86	106	141	63	0	0	no	-
> 23	I	MG	24	24	0	94	94	67	67	no	-
Total			816	168	648	255	161	67	67		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburne MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

North-facing aspects (prescribed fire alone)

Unburned

HCross

Unburned

North Breaks

North-facing aspects

Condition 31: Prescribed fire HCross

Slope: > 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	85	70
≤ 6	-	4	83	-	-	-	2	Mineral soil	11	3
> 6 ≤ 12	1	11	70	3	6	3	3	Grass	4	15
> 12 ≤ 23	4	21	71	4	8	4	4	Forbs	1	10
> 23	6	28	66	6	14	8	4	Low shrub	5	5
								Med. shrub	29	10

Horizontal tree description and burn severity										Juniper w/ fire	
			Ponderosa pine trees/acre			Ponderosa pine volume					
						total (ft^3/acre)		merchantable (ft^3/acre)			
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	w/o fire	w/ fire	change	w/o fire	w/ fire	w/o fire	w/ fire	present	alive (%)
≤ 6	IC	B	168	0	168	0	0	0	0	no	-
> 6 ≤ 12	IC	MB	96	48	48	7	4	0	0	yes	0
> 12 ≤ 23	I	MB	264	238	26	271	244	0	0	no	-
> 23	I	MG	240	240	0	604	604	197	197	no	-
Total			768	526	242	882	852	197	197		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 32: Prescribed fire North Breaks

Slope: > 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	97	25
≤ 6	-	4	61	-	-	-	1	Mineral soil	4	90
> 6 ≤ 12	1	10	61	3	4	1	2	Grass	1	2
> 12 ≤ 23	3	19	59	7	10	3	2	Forbs	0	1
> 23	6	29	56	13	13	0	3	Low shrub	1	0
								Med. shrub	0	0

Horizontal tree description and burn severity										Juniper w/ fire	
			Ponderosa pine trees/acre			Ponderosa pine volume					
						total (ft^3/acre)		merchantable (ft^3/acre)			
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	w/o fire	w/ fire	change	w/o fire	w/ fire	w/o fire	w/ fire	present	alive (%)
≤ 6	I	B	288	0	288	5	0	0	0	no	-
> 6 ≤ 12	I	MB	528	53	475	47	5	0	0	no	-
> 12 ≤ 23	IC	MG	912	274	638	521	156	0	0	no	-
> 23	I	MB	192	77	115	485	194	190	76	no	-
Total			1920	404	1516	1058	355	190	76		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

North-facing aspects (prescribed fire alone)

Unburned

South Breaks 1

Unburned

South Breaks 2

Unburned

South Breaks 3

North-facing aspects

Condition 33: Prescribed fire South Breaks 1

Slope: > 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	80	85
								Mineral soil	5	10
≤ 6	-	5	40	-	-	-	1	Grass	5	45
> 6 ≤ 12	3	11	47	2	6	4	2	Forbs	1	2
> 12 ≤ 23	3	22	60	2	6	4	1	Low shrub	36	2
> 23	7	36	54	20	28	8	2	Med. shrub	1	5

Horizontal tree description and burn severity											
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	Ponderosa pine trees/acre w/ fire	Ponderosa pine trees/acre change	Ponderosa pine volume total (ft³/acre) w/o fire	Ponderosa pine volume total (ft³/acre) w/ fire	Ponderosa pine volume merchantable (ft³/acre) w/o fire	Ponderosa pine volume merchantable (ft³/acre) w/ fire	Juniper w/ fire present	Juniper w/ fire alive (%)
≤ 6	IC	MB	24	0	24	0	0	0	0	no	-
> 6 ≤ 12	IC	MB	72	29	43	0	0	0	0	yes	100
> 12 ≤ 23	I	MB	120	84	36	120	84	0	0	no	-
> 23	I	MG	332	282	50	1660	1411	996	847	no	-
Total			548	395	153	1780	1495	996	847		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 34: Prescribed fire South Breaks 2

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	90	95
								Mineral soil	90	5
≤ 6	-	2	65	2	5	3	1	Grass	0	5
> 6 ≤ 12	2	11	48	5	10	5	2	Forbs	6	2
> 12 ≤ 23	4	18	67	8	11	3	1	Low shrub	1	2
> 23	7	35	67	8	20	12	4	Med. shrub	25	0

Horizontal tree description and burn severity											
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	Ponderosa pine trees/acre w/ fire	Ponderosa pine trees/acre change	Ponderosa pine volume total (ft³/acre) w/o fire	Ponderosa pine volume total (ft³/acre) w/ fire	Ponderosa pine volume merchantable (ft³/acre) w/o fire	Ponderosa pine volume merchantable (ft³/acre) w/ fire	Juniper w/ fire present	Juniper w/ fire alive (%)
≤ 6	I	MG	96	10	86	0	0	0	0	no	-
> 6 ≤ 12	I	MG	144	137	7	27	26	0	0	yes	0
> 12 ≤ 23	IC	MG	120	120	0	79	79	0	0	no	-
> 23	I	U	336	336	0	1423	1423	621	621	no	-
Total			696	603	93	1529	1528	621	621		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 35: Prescribed fire South Breaks 3

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	2	50
								Mineral soil	2	20
≤ 6	-	4	73	-	-	-	6	Grass	3	60
> 6 ≤ 12	2	9	69	-	-	-	7	Forbs	2	40
> 12 ≤ 23	3	18	64	-	-	-	16	Low shrub	4	15
> 23	8	34	75	11	16	5	16	Med. shrub	23	1

Horizontal tree description and burn severity											
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	Ponderosa pine trees/acre w/ fire	Ponderosa pine trees/acre change	Ponderosa pine volume total (ft³/acre) w/o fire	Ponderosa pine volume total (ft³/acre) w/ fire	Ponderosa pine volume merchantable (ft³/acre) w/o fire	Ponderosa pine volume merchantable (ft³/acre) w/ fire	Juniper w/ fire present	Juniper w/ fire alive (%)
≤ 6	IC	N	264	0	264	0	0	0	0	no	-
> 6 ≤ 12	IC	N	216	0	216	44	0	0	0	no	-
> 12 ≤ 23	IC	B	240	0	240	143	0	0	0	no	-
> 23	I	MB	264	66	198	1357	339	902	226	no	-
Total			984	66	918	1544	339	902	226		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy,IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

North-facing aspects (prescribed fire followed by wildfire)

Unburned

6X7W followed by Germaine

Unburned

HCross followed by Germaine

Unburned

North Breaks followed by Germaine

North-facing aspects

Condition 36: Site where the Germaine wildfire burned through prescribed fire 6X7W

Slope: > 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	85	20
								Mineral soil	11	5
≤ 6	-	4	83	1	2	1	2	Grass	4	40
> 6 ≤ 12	1	11	70	4	8	4	2	Forbs	1	12
> 12 ≤ 23	4	21	71	4	8	4	2	Low shrub	4	5
> 23	6	28	66	11	16	5	10	Med. shrub	27	25

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft³/acre) w/o fire	w/ fire	merchantable (ft³/acre) w/o fire	w/ fire	present	alive (%)
≤ 6	I	MB	168	59	109	0	0	0	0	no	-
> 6 ≤ 12	I	MB	96	48	48	7	4	0	0	yes	0
> 12 ≤ 23	IC	MB	264	224	40	271	230	0	0	no	-
> 23	I	MG	240	228	12	604	574	197	187	no	-
Total			768	559	209	882	808	197	187		

[1]**Spacing (Sp.)**: U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity (Sev.)**: U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 37: Site where the Germaine wildfire burned through prescribed fire HCross

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	60	15
								Mineral soil	13	45
≤ 6	-	3	90	0	5	5	2	Grass	20	30
> 6 ≤ 12	2	9	93	1	3	2	2	Forbs	2	5
> 12 ≤ 23	5	16	75	2	3	1	2	Low shrub	5	15
> 23	-	-	-	-	-	-	-	Med. shrub	0	25

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft³/acre) w/o fire	w/ fire	merchantable (ft³/acre) w/o fire	w/ fire	present	alive (%)
≤ 6	IC	MB	96	48	48	0	0	0	0	no	-
> 6 ≤ 12	I	MB	120	60	60	14	7	0	0	no	-
> 12 ≤ 23	I	MB	24	12	12	31	16	0	0	no	-
> 23	-	-	0	0	-	0	0	0	0	no	-
Total			240	120	120	45	23	0	0		

[1]**Spacing (Sp.)**: U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity (Sev.)**: U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 38: Site where the Germaine wildfire burned through prescribed fire North Breaks

Slope: > 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	95	16
								Mineral soil	0	50
≤ 6	-	5	58	-	-	-	6	Grass	0	22
> 6 ≤ 12	2	10	59	-	-	-	12	Forbs	0	14
> 12 ≤ 23	4	17	65	-	-	-	23	Low shrub	1	7
> 23	8	34	57	-	-	-	3	Med. shrub	18	2

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft³/acre) w/o fire	w/ fire	merchantable (ft³/acre) w/o fire	w/ fire	present	alive (%)
≤ 6	I	N	288	0	288	0	0	0	0	yes	0
> 6 ≤ 12	I	N	480	0	480	66	0	0	0	yes	0
> 12 ≤ 23	IC	N	576	0	576	437	0	0	0	yes	0
> 23	I	B	288	0	288	1737	0	1116	0	no	-
Total			1632	0	1632	2240	0	1116	0		

[1]**Spacing (Sp.)**: U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity (Sev.)**: U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

North-facing aspects (prescribed fire followed by wildfire)

Unburned

South Breaks 1 followed by Indian

Unburned

South Breaks 2 followed by Indian

Unburned

South Breaks 3 followed by Germaine

North-facing aspects

Condition 39: Site where the Indian wildfire burned through prescribed fire South Breaks 1

Slope: > 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	85	10
								Mineral soil	11	25
≤ 6	-	4	83	-	-	-	2	Grass	4	12
> 6 ≤ 12	1	11	70	3	8	5	4	Forbs	1	4
> 12 ≤ 23	4	21	71	4	8	4	11	Low shrub	4	9
> 23	6	28	66	5	9	4	3	Med. shrub	27	10

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft^3/acre) w/o fire	w/ fire	merchantable (ft^3/acre) w/o fire	w/ fire	present	alive (%)
≤ 6	I	B	168	0	168	0	0	0	0	yes	0
> 6 ≤ 12	IC	MB	96	24	72	7	2	0	0	yes	0
> 12 ≤ 23	I	MB	264	53	211	271	54	0	0	no	-
> 23	I	MG	240	240	0	604	604	197	197	no	-
Total			768	317	451	882	660	197	197		

[1]**Spacing (Sp.)**: U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity (Sev.)**: U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 40: Site where the Indian wildfire burned through prescribed fire South Breaks 2

Slope: > 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	95	40
								Mineral soil	0	60
≤ 6	-	5	58	-	-	-	3	Grass	0	4
> 6 ≤ 12	2	10	59	1	4	3	2	Forbs	0	2
> 12 ≤ 23	4	17	65	4	8	4	1	Low shrub	1	2
> 23	8	34	57	0	0	0	1	Med. shrub	18	1

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft^3/acre) w/o fire	w/ fire	merchantable (ft^3/acre) w/o fire	w/ fire	present	alive (%)
≤ 6	UC	B	288	0	288	0	0	0	0	yes	0
> 6 ≤ 12	UC	MG	480	144	336	66	20	0	0	yes	0
> 12 ≤ 23	UC	MG	576	461	115	437	350	0	0	yes	0
> 23	I	U	288	288	0	1737	1737	1116	1116	no	-
Total			1632	893	739	2240	2107	1116	1116		

[1]**Spacing (Sp.)**: U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity (Sev.)**: U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 41: Site where the Germaine wildfire burned through prescribed fire South Breaks 3

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	95	20
								Mineral soil	0	30
≤ 6	-	-	-	-	-	-	-	Grass	85	40
> 6 ≤ 12	3	10	70	-	-	-	12	Forbs	20	2
> 12 ≤ 23	4	15	65	-	-	-	23	Low shrub	4	5
> 23	8	32	62	7	11	4	20	Med. shrub	3	5

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft^3/acre) w/o fire	w/ fire	merchantable (ft^3/acre) w/o fire	w/ fire	present	alive (%)
≤ 6	-	-	0	0	-					yes	0
> 6 ≤ 12	IC	B	24	0	24	7	0	0	0	no	-
> 12 ≤ 23	I	B	48	0	48	24	0	0	0	no	-
> 23	I	MB	228	23	205	1400	140	976	98	no	-
Total			300	23	277	1431	140	976	98		

[1]**Spacing (Sp.)**: U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity (Sev.)**: U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Ridge or bench (wildfire alone)

Unburned

Germaine surrounding 6X7W

Unburned

Germaine surrounding HCross

Unburned

Indian surrounding South Breaks 1

Ridges or benches

Condition 42: Germaine wildfire, surrounding prescribed fire 6X7W

Slope: > 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	3	1
								Mineral soil	28	35
≤ 6								Grass	70	35
> 6 ≤ 12			No trees					Forbs	4	30
> 12 ≤ 23								Low shrub	15	5
> 23								Med. shrub	5	3

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft³/acre) w/o fire	w/ fire	merchantable (ft³/acre) w/o fire	w/ fire	present	alive (%)
≤ 6			No trees								
> 6 ≤ 12											
> 12 ≤ 23											
> 23											
Total											

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 43: Germaine wildfire, surrounding prescribed fire HCross

Slope: > 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	50	8
								Mineral soil	1	40
≤ 6	-	-	-	-	-	-	-	Grass	5	45
> 6 ≤ 12	4	12	98	1	3	2	2	Forbs	4	5
> 12 ≤ 23	1	13	100	2	4	2	2	Low shrub	5	8
> 23	-	-	-	-	-	-	-	Med. shrub	20	5

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft³/acre) w/o fire	w/ fire	merchantable (ft³/acre) w/o fire	w/ fire	present	alive (%)
≤ 6	-	-	0	0	-	0	0	0	0	no	-
> 6 ≤ 12	IC	MG	144	144	0	50	50	0	0	no	-
> 12 ≤ 23	I	MG	48	48	0	5	5	0	0	no	-
> 23	-	-	0	0	-	0	0	0	0	no	-
Total			192	192	0	55	55	0	0		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 44: Indian wildfire, surrounding prescribed fire South Breaks 1

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	3	1
								Mineral soil	28	3
≤ 6								Grass	70	35
> 6 ≤ 12			No trees					Forbs	4	2
> 12 ≤ 23								Low shrub	15	5
> 23								Med. shrub	5	3

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft³/acre) w/o fire	w/ fire	merchantable (ft³/acre) w/o fire	w/ fire	present	alive (%)
≤ 6			No trees								
> 6 ≤ 12											
> 12 ≤ 23											
> 23											
Total											

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Ridge or bench (prescribed fire alone)

Unburned

HCross

Ridges or benches

Condition 45: Prescribed fire HCross

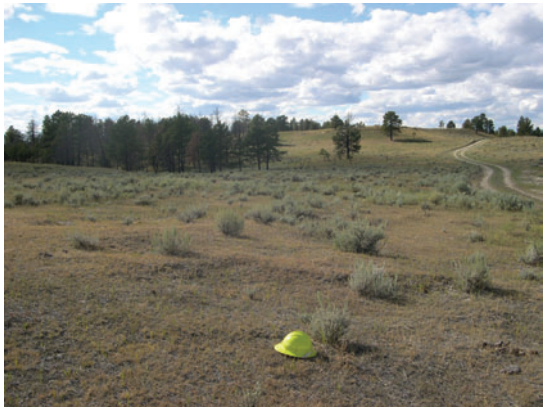
Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	3	20
≤ 6	-	2	95	0	1	1	1	Mineral soil	30	10
> 6 ≤ 12	-	-	-	-	-	-	-	Grass	30	65
> 12 ≤ 23	-	-	-	-	-	-	-	Forbs	5	10
> 23	-	-	-	-	-	-	-	Low shrub	5	10
								Med. shrub	30	3

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	Ponderosa pine trees/acre w/ fire	Ponderosa pine trees/acre change	Ponderosa pine volume total (ft^3/acre) w/o fire	Ponderosa pine volume total (ft^3/acre) w/ fire	Ponderosa pine volume merchantable (ft^3/acre) w/o fire	Ponderosa pine volume merchantable (ft^3/acre) w/ fire	present	alive (%)
≤ 6	I	MG	24	24	0	0	0	0	0	no	-
> 6 ≤ 12	-	-	0	0	-	0	0	0	0	no	-
> 12 ≤ 23	-	-	0	0	-	0	0	0	0	no	-
> 23	-	-	0	0	-	0	0	0	0	no	-
Total			24	24	0	0	0	0	0		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Ridge or bench (prescribed fire alone)

Unburned



South Breaks 1

Unburned

South Breaks 2

Unburned

South Breaks 3

Ridges or benches

Condition 46: Prescribed fire South Breaks 1

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	3	30
								Mineral soil	28	25
≤ 6								Grass	70	40
> 6 ≤ 12			No trees					Forbs	4	5
> 12 ≤ 23								Low shrub	15	0
> 23								Med. shrub	5	25

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft³/acre) w/o fire	w/ fire	merchantable (ft³/acre) w/o fire	w/ fire	present	alive (%)
≤ 6											
> 6 ≤ 12			No trees								
> 12 ≤ 23											
> 23											
Total											

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 47: Prescribed fire South Breaks 2

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	90	4
								Mineral soil	11	10
≤ 6	-	4	99	0	0	0	1	Grass	7	75
> 6 ≤ 12	3	11	70	0	0	0	1	Forbs	1	3
> 12 ≤ 23	5	18	67	8	12	4	7	Low shrub	5	10
> 23	9	29	79	5	8	3	4	Med. shrub	1	2

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft³/acre) w/o fire	w/ fire	merchantable (ft³/acre) w/o fire	w/ fire	present	alive (%)
≤ 6	I	MG	24	12	12	0	0	0	0	no	-
> 6 ≤ 12	I	MG	24	16	8	7	5	0	0	no	-
> 12 ≤ 23	IC	MB	72	25	47	101	35	0	0	no	-
> 23	IC	MG	168	168	0	890	890	575	575	no	-
Total			288	221	67	998	930	575	575		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 48: Prescribed fire South Breaks 3

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	90	30
								Mineral soil	11	2
≤ 6	-	4	99	1	1	0	0	Grass	7	95
> 6 ≤ 12	3	11	70	4	5	1	2	Forbs	1	2
> 12 ≤ 23	5	18	67	5	6	1	3	Low shrub	5	10
> 23	9	29	79	6	10	4	6	Med. shrub	1	7

Horizontal tree description and burn severity										Juniper w/ fire	
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	Ponderosa pine trees/acre w/o fire	w/ fire	change	Ponderosa pine volume total (ft³/acre) w/o fire	w/ fire	merchantable (ft³/acre) w/o fire	w/ fire	present	alive (%)
≤ 6	I	U	24	24	0	0	0	0	0	no	-
> 6 ≤ 12	IC	U	24	24	0	7	7	0	0	yes	0
> 12 ≤ 23	I	MG	72	72	0	101	101	0	0	no	-
> 23	IC	MG	168	168	0	890	890	575	575	no	-
Total			288	288	0	998	998	575	575		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Ridge or bench (prescribed fire followed by wildfire)

Unburned

HCross followed by Germaine

Unburned

North Breaks followed by Germaine

Ridges or benches

Condition 49: Site where the Germaine wildfire burned through prescribed fire HCross

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	80	20
≤ 6	.	5	70	-	-	-	2	Mineral soil	3	20
> 6 ≤ 12	2	9	97	2	5	3	4	Grass	40	65
> 12 ≤ 23	4	20	90	2	8	6	4	Forbs	1	8
> 23	-	-	-	-	-	-	-	Low shrub	2	10
								Med. shrub	25	10

Horizontal tree description and burn severity										Juniper w/ fire	
			Ponderosa pine trees/acre			Ponderosa pine volume total (ft^3/acre)		Ponderosa pine volume merchantable (ft^3/acre)			
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	w/o fire	w/ fire	change	w/o fire	w/ fire	w/o fire	w/ fire	present	alive (%)
≤ 6	IC	B	48	0	48	0	0	0	0	no	-
> 6 ≤ 12	IC	MB	264	53	211	0	0	0	0	no	-
> 12 ≤ 23	IC	MB	24	6	18	24	6	0	0	no	-
> 23	-	-	0	0	-	0	0	0	0	no	-
Total			336	59	277	24	6	0	0		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 50: Site where the Germaine wildfire burned through prescribed fire North Breaks

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	90	4
≤ 6	-	4	99	-	-	-	2	Mineral soil	11	5
> 6 ≤ 12	3	11	70	0	2	2	1	Grass	7	35
> 12 ≤ 23	5	18	67	2	5	3	1	Forbs	1	65
> 23	9	29	79	3	12	9	3	Low shrub	5	4
								Med. shrub	1	10

Horizontal tree description and burn severity										Juniper w/ fire	
			Ponderosa pine trees/acre			Ponderosa pine volume total (ft^3/acre)		Ponderosa pine volume merchantable (ft^3/acre)			
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	w/o fire	w/ fire	change	w/o fire	w/ fire	w/o fire	w/ fire	present	alive (%)
≤ 6	I	B	24	0	24	0	0	0	0	no	-
> 6 ≤ 12	IC	MB	24	4	20	7	1	0	0	no	-
> 12 ≤ 23	I	MG	72	65	7	101	91	0	0	no	-
> 23	I	MG	168	168	0	890	890	575	575	no	-
Total			288	237	51	998	982	575	575		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Ridge or bench (prescribed fire followed by wildfire)

Unburned

South Breaks 1 followed by Indian

Unburned

South Breaks 3 followed by Germaine

Ridges or benches

Condition 51: Site where the Indian wildfire burned through prescribed fire South Breaks 1

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	90	5
≤ 6	-	4	99	1	3	2	7	Mineral soil	3	15
> 6 ≤ 12	3	11	70	5	7	2	1	Grass	40	65
> 12 ≤ 23	5	18	67	4	6	2	5	Forbs	1	2
> 23	9	29	79	5	7	2	1	Low shrub	2	8
								Med. shrub	25	10

Horizontal tree description and burn severity										Juniper w/ fire	
			Ponderosa pine trees/acre			Ponderosa pine volume					
						total (ft^3/acre)		merchantable (ft^3/acre)			
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	w/o fire	w/ fire	change	w/o fire	w/ fire	w/o fire	w/ fire	present	alive (%)
≤ 6	I	MG	24	18	6	0	0	0	0	no	-
> 6 ≤ 12	I	MB	24	12	12	7	4	0	0	no	-
> 12 ≤ 23	I	U	72	72	0	101	101	0	0	no	-
> 23	IC	U	168	168	0	890	890	575	575	no	-
Total			288	270	18	998	995	575	575		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

Condition 52: Site where the Germaine wildfire burned through prescribed South Breaks 3

Slope: ≤ 25%								Substrate	% cover	
Vertical tree description									w/o fire	w/ fire
Tree height class (ft)	dbh (in) w/o fire	ht (ft) w/o fire	Crown ratio w/o fire (%)	Canopy base height (w/ fire) from (ft)	to (ft)	change (ft)	Low scorch height (ft)	Litter	90	20
≤ 6	-	4	99	-	-	-	7	Mineral soil	3	40
> 6 ≤ 12	3	11	70	6	12	6	1	Grass	40	40
> 12 ≤ 23	5	18	67	6	7	1	5	Forbs	1	5
> 23	9	29	79	7	14	7	1	Low shrub	2	4
								Med. shrub	25	2

Horizontal tree description and burn severity										Juniper w/ fire	
			Ponderosa pine trees/acre			Ponderosa pine volume					
						total (ft^3/acre)		merchantable (ft^3/acre)			
Tree height class (ft)	Sp.[1] w/ fire	Sev.[2] w/ fire	w/o fire	w/ fire	change	w/o fire	w/ fire	w/o fire	w/ fire	present	alive (%)
≤ 6	IC	N	24	0	24	0	0	0	0	no	-
> 6 ≤ 12	IC	MB	24	2	22	7	1	0	0	yes	0
> 12 ≤ 23	IC	MB	72	14	58	101	20	0	0	no	-
> 23	I	MB	168	134	34	890	712	575	460	no	-
Total			288	150	138	998	733	575	460		

[1]**Spacing** (**Sp.**): U=uniform, I=irregular, UC=uniform clumpy, IC=irregular clumpy [2]**Severity** (**Sev.**): U=unburned, MG=scorched, most needles green, MB=scorched, most needles brown, B=all needles brown, N=no needles

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