



## 2018 Prescribed Burn Fire Effects Monitoring Report Ashland Forest All-Lands Restoration Initiative

Forest Service AFR Units 4a & 7c, City of Ashland Unit B3/E1/B4, and Private Land Unit EPPB1

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**Acres Burned in 2018: 126**

**Fuel Types: Timber, Shrub, Grass**

**Primary Fuel Models: TL3, TL1, TU1**

### Summary

Four prescribed burns were safely executed in the Ashland Watershed in Spring 2018 on Federal, City, and Private lands, cumulatively burning 126 acres. All burns were implemented to restore historic low intensity fire into the dry forests of Southern Oregon and reduce wildfire risk by reducing surface and understory fuels while maintaining overstory canopy, legacy trees, soil stability, and wildlife habitat. All units burned with varied intensity, creating a mosaic of low to moderate intensity fire effects both among each individual burn as well as across the landscape. Fire intensities varied from natural differences such as landscape position, forest structure and fuel loading but also operational differences such as pre-burn site prep, burn-day conditions, and firing patterns. Areas with residual activity fuels from prior thinning operations lent to more moderate fire effects, while areas with dense canopy or sparse fuels burned at very low intensity.

All burns maintained legacy trees, overstory and ground cover while reintroducing fire into a fire-adapted ecosystem. Surface fuels were effectively reduced across the majority of the burned areas. Half of the units adequately maintained understory cover, while the others exhibited higher fire-killed mortality of shrubs and small trees. Across most of the units, consumption of large habitat snags and downed wood was higher than planned. On the last day of burning, May 14, residual smoke drifting downcanyon in the evening after ignitions completed on two of the units caused a moderate smoke intrusion into Ashland.

## Purpose and Resource Goals

Operations were conducted as part of the landscape-scale forest stewardship work of the Ashland Forest Resiliency (AFR) project (4a & 7c) and the Ashland Forest All-Lands Restoration Initiative (AFARI) (B3/E1/B4 & EPPB1) under the partnership of the U.S. Forest Service (USFS), City of Ashland (COA), Lomakatsi Restoration Project (LRP), and The Nature Conservancy (TNC). The burns were executed with a collaborative effort by diverse crews including partnership staff, Grayback Forestry Inc. (private contractor), and participants of the 2018 Ashland Prescribed Fire Training Exchange (TRES). See Table 1 for a summary of the burn units and implementation.

Resource and burn objectives were developed by the AFR Partnership to reflect goals for prescribed burning on the USFS planned burns. They have since been expanded to evaluate fire effects across the larger Ashland Forest All-Lands Restoration Initiative (AFARI), however at the time of the burn planning, separate objective thresholds were developed and measured for the different Federal, City, and Private units. In this report you will find analyses of fire effects for all the prescribed burns conducted in the Ashland Watershed in 2018 under both the objectives for the specific burn as well as under the general AFR objective thresholds. All of the burns share mirroring goals and objectives.

### AFR Resource Management Goals

- I. Restore forest stands to conditions that promote functional processes that more closely resemble the historical occurrence of more frequent but lower to moderate severity disturbance
- II. Protect core public and private values at risk of catastrophic wildland fire disturbances, particularly those associated with:
  - a. safeguarding human life,
  - b. protecting property,
  - c. protecting socio-economic and municipal watershed values,
  - d. conservation of late-successional biological and structural diversity
  - e. enhancing wildlife habitat
- III. Reduce hazardous fuels and obtain conditions that are more resilient to wildland fires
- IV. Minimize mortality of legacy trees (*large, old trees with complex form, large branches, open structure, wide bark plates, and providing important habitat features and aesthetic value*)

### 2018 AFR Prescribed Fire Objectives

1. Reduce litter and light surface fuels (1 to 100-hr) by 30 - 80%
2. Retain > 30% of shrubs and understory trees (< 5" DBH)
3. Limit mortality of intermediate trees (5-12" DBH) to < 40%
4. Retain > 90% dominant/codominant trees (> 12" DBH)
5. Retain > 97% of conifers > 30" DBH and hardwoods > 20" DBH
6. Retain overall effective ground cover for the unit based on soil erosion hazard class:
  - moderate (< 35% gradient), > 60% year-1, > 70% year-2;
  - severe or higher (> 35% gradient), > 70% year-1, > 85% year-2
7. Retain approximately 90% large down logs or snags (> 20" diameter)
8. Minimize fire intensity in leave areas with crown scorch of canopy trees < 20%
9. Retain an unburned strip of duff 25'-50' wide and coarse woody material within 50' of perennial streams.

**Table 1.** Burn implementation summary for the prescribed burns conducted across the Ashland All-Lands Restoration Initiative (ARAFI) footprint in 2018.

Unit Names	AFR 4a	AFR 7c	EPPB1	B3/E1/B4
<b>Ownership</b>	US Forest Service	US Forest Service	Private	City of Ashland
<b>2018 Burn Dates</b>	May-12 & May-14	May-10	Apr-23, May-7 & May-8	May-14
<b>Acres Planned</b>	50	30	44	28
<b>Acres Burned</b>	50	22	44	10
<b>Burn Boss</b>	Rob Marshall, Ruth Johnson	Rob Marshall	Aric Coleman, Tim Henagin, Ryan Watkins	Tim Henagin
<b>Burn Boss trainees</b>	Jonathan Paul, Rich Howe	Jonathan Paul	N/A	N/A
<b>FEMO</b>	Lyndsey Lascheck & Jena Volpe	Jena Volpe	N/A	N/A
<b>FEMO trainees</b>	Richard Harrington & Yvette Leecy	Debra Nemens & Yvette Leecy	N/A	N/A
<b>Primary Aspect</b>	S	S	S	W
<b>Average % Slope</b>	53	48	34	49
<b>Max elevation ft.</b>	3680	3640	3480	2990
<b>Min elevation ft.</b>	2840	3200	3080	2390

### Unit Descriptions

All units have been prioritized by the AFR partnership for strategic wildfire protection of the Ashland Watershed and surrounding communities, reducing fuels and fire hazard in upslope and upcanyon directions. All units lead to strategic ridgelines and some are located in areas with high visibility due to adjacency to or are directly intersected by recreational trail use, as in AFR 4a, COA B3/E1/B4, & EPPB1 (Map 1).

The units consist of dry-mixed conifer/hardwood forests on granitic soils that have history of mechanical treatment, wildfire, and, in some cases, some previous prescribed underburns. Canopies are mostly closed with overstory composition varying by aspect. Northern and eastern slopes are dominated primarily by Douglas-fir and Pacific madrone with ridges and southern and westerns aspects dominated by ponderosa pine with a Douglas-fir component, some California black oaks and few Oregon white oaks and sugar pines. Stands are generally even-aged, initiated by early century wildfire or harvest activities with conifers dominating the 8"-20" DBH size class. Hardwoods tend to persist in the mid- and understory, with madrone sometimes reaching the overstory, in the 6"-16" DBH size class. Where present, larger hardwoods are often overtopped by conifers, reducing vigor and resistance to fire.

Understory conditions vary based on landscape position, stand structure and treatment history but are generally open and lacking vegetation where existing stand density and canopy closure limits light penetration and available water. Ladder fuels and shrub cover have been greatly reduced by mechanical

treatments. Short grasses and forbs are patchy, only persisting in the understory in areas with less canopy. Shrubs either exist as individuals or small patches, primarily manzanita, mountain mahogany or deerbrush, remaining mainly as retention designed in the mechanical treatments. In some areas, madrone resprout is a significant understory component.

Surface fuels in the units are dominated by moderate loads of conifer litter, having a broadleaf component under the madrone or oak when present. Grass and shrub components influence the fuels where present but generally lack extensive continuity. Some residual fuels from mechanical treatments that were not completely consumed or disposed of in burn piles persisted on the EPPB1 and 7c burn units, and particularly on the top part of 4a. Pockets of tree mortality also contributed to increased surface fuels. Dominant pre-burn fuel models include moderate load of conifer litter (TL3), sometimes including substantial amounts of small down logs (TL4), or with some low load of timber-grass-shrubs (TU1). See Table 2 and below for summary of pre-burn unit conditions.

#### *AFR 4a & 7c*

Forest stands were initiated, in general, from historic wildfire, though isolated legacy trees persist. Mechanical treatments started in both these units with a surface and ladder treatment in 2011, followed by a commercial thinning timber harvest by helicopter in 2013. Pile burning of activity fuels from each of those treatments occurred post-harvest in 2012 and again in 2014.

Topography in 4a was very diverse with multiple lateral ridgelines developing on the lower half of the unit. The north handline ran down an exposed ridgeline, with the southeast line located along the bottom of a draw. Multiple shrub retention patches and one Fisher block existed in the unit. Numerous unburned handpiles from the 2011 thinning persisted, particularly on the top of the unit. This was the steepest of the units burned in 2018, with an average slope of 58%.

The portion of 7c that was burned in 2018 consisted of a dominantly southern aspect with an average slope of 48%. This landscape position produced thin, erosive soils resulting in low loads of sparse surface fuels. While portions of the unit both uphill and downhill from the 2060 Road were intended to burn only the uphill portion was burned in 2018 (Map 1).

#### *EPPB1*

The landowners steward and actively manage this property and have selectively harvested commercial timber, implemented non-commercial fuels treatments, and done some previous prescribed underburning. Within the burn unit, prior treatments have resulted in well-spaced conifers averaging 16"-20" DBH, open understory, and reduced surface and ladder fuels. Additional pre-burn site preparations were made including raking and removing excess fuels around dominant trees. Legacy trees are generally absent in this unit. Slopes were the gentlest of the units, with an average of 34%.

#### *COA B3/E1/B4*

This unit is located among a block of COA treatment units located east and above Ashland Creek that have received similar treatments including thinning and prescribed burning. This unit was non-commercially thinned and pile burned in 1997-1998, helicopter thinned in 2004, and treated for additional fuels in 2006-2007. Topography was split on the unit according to a medial draw, with Douglas-fir dominating the northern aspects and ponderosa pine and hardwoods persisting on the

southern exposures and top of the unit. Stands become more closed and wet towards the bottom with the influence of Ashland Creek, though only 10 acres on the top of the unit near a ridge were burned in 2018, leaving the 18 acres at the bottom unburned. Slope percent averages 50% unit wide, but the 10-acres burned in 2018 average 60%.

**Table 2.** Summary of before-and-after burn unit conditions

	<b>Total</b>	<b>AFR 4a</b>	<b>AFR 7c</b>	<b>EPPB1</b>	<b>B3/E1/B4</b>
2018 Burn Date	<b>Spring</b>	5/12 - 5/14	5/10	4/23 & 5/7-5/8	5/14
Planned Acres	<b>152</b>	50	30	44	28
Burned Acres	<b>126</b>	50	22	44	10
% Unit Area Burned	<b>75%</b>	91%	34%	75%	84%
Fuel Model Proportions pre-burn	<b>TL3:TL1 5 : 2</b>	TL3:TU2 2 : 1	TL3:TL1 3 : 1	TL3:TL4:TU1 3 : 1 : 1	TL5:TU1 1 : 1
Fuel Model Proportions post-burn	<b>TL3:TL1 1 : 6</b>	TL1 1	TL1:TL3 1 : 1	TL1:TU1 4 : 1	TL1 1
Average % Canopy Closure pre-burn	<b>65%</b>	51%	53%	86%	66%
Average % Canopy Closure post-burn	<b>59%</b>	47%	53%	80%	46% <sup>1</sup>
AFR Objectives Met	<b>8 of 9</b>	6 of 8	5 of 7	7 of 7	3 of 5
Unit Objectives Met	<b>N/A</b>	6 of 8	5 of 7	4 of 4	3 of 7
FEMO Monitoring Plot Sample Size	<b>22</b>	6	4	5	8 <sup>2</sup>

### Prescribed Fire Implementation Summary

All burns occurred in May of 2018, with the exception of the first day of the EPPB1 burn which was burned in April. In general, conditions remained within prescription (Appendix B). Firing patterns and pacing were adjusted as needed to maintain desired fire behavior and effects when conditions fluctuated, as detailed below. In some cases, the burn operations were ceased when either fuel moistures were too low or observed effects were exceeding objectives, resulting in partial acreage burned on the COA unit and three days of burn operations on EPPB1. See Appendix C for timelines, operation details, and fire behavior for each unit.

#### AFR 4a

This unit was burned in three consecutive days, executed by U.S. Forest Service, 2018 TREX participants, and Grayback Forestry personnel and equipment. Conditions stayed within prescription ranges (Appendix A) with the last day of the burn seeing the hottest and driest conditions (Appendix B). That day, the fine fuel moisture dipped just below the minimum acceptable level (7%), however, at the time,

<sup>1</sup> Post-burn canopy data only available using the LRP Forest Inventory plots (n=2), and likely overestimate actual canopy closure reduction.

<sup>2</sup> Most summary data come from six COA CBI Monitoring plots; additional metrics not covered by COA plots were measured in two LRP Forest Inventory plots (see Fire Monitoring Methods).

all other conditions and fire behavior remained acceptable. Ignitions progressed slowly through the unit to maintain low to moderate fire intensity, accomplishing the following burned acres over three days:

5/12: 8 acres

5/13: 15 acres

5/14: 25 acres

Primarily, dot-dash ignition patterns were used, bump-floating one line of lighters to keep intensity low.

When unburned handpiles were encountered, mostly at the top of the unit, they were lit from the uphill side, often staggering the lighting of the piles to reduce intensity. Ignitions continued slowly

when lighting through the fisher block to maintain low intensity, attempting to allow fire to creep in without direct ignition, but some dotting did occur. At the bottom of the unit, firing patterns shifted to take advantage of diverse topography and increasing fuel moistures at the end of the day. Here, lighters stripped the ridges and let the fire flank into the draws.



#### *AFR 7c*

This unit was burned by 2018 TREX participants with some Forest Service resources assisting. The southern aspects of this unit, both above and below the road, were planned to burn (Map 1). The 22 acres above the road were burned in one day and priorities shifted away from that unit before able to burn the 10 acres below the road. Weather conditions (Appendix B) were consistent with the 'low fire intensity' range while fuel moistures stayed within the 'desired' range (Appendix A). The part of this unit the was burned had a lesser fuel load than the rest of the units in the burn plan so could have benefited from drier conditions to increase the availability of target fuel consumption (see Monitoring Results). Stripping head fire patterns were used with increasing lighters throughout the day to try to increase intensity and fuel consumption.

#### *EPPB1*

This burn was conducted by Grayback Forestry with support from Small Woodland Services Inc. (SWS) and LRP on private property. Conditions remained in the desired range, being low in some mornings and reaching into the higher range on the first day (Appendix B). The first day of ignitions were ceased at 1530 after burning only 4 acres because low humidity and fuel moistures resulted in increased fire behavior and effects. Two weeks later, after a rain event, crews returned to burn the remaining acreage with the following daily acres burned:

4/23: 4 acres

5/7: 20 acres

5/8: 15 acres

One line of four lighters bump-floated using dot-dash, strip, or heading ignition patterns depending on conditions. At the end of the last day, 6 lighters were stacked to finish the unit when it started to rain at 1530.



*Photos of time series showing dot ignitions through pine litter on EPPB1 exhibiting low fire behavior resulting in moderate consumption of surface fuels and some scorching of low pine branches and small trees.*

#### *COA B3/E1/B4*

This unit was burned by Grayback Forestry with support from the City of Ashland and SWS. Ignitions began in the morning with higher than desired fine-fuel moistures (13%) and desired 10-hr fuel moistures (9%). 100-hour fuel moistures were reportedly low but considered acceptable and ignitions continued. Fine fuel moistures dropped quickly, reaching the minimum acceptable moisture (6%) at 1400 (Appendix B). Ignitions were completed with 10-acres burned at 1500 because of low fuel moistures producing higher than intended fire effects and an opportunity to tie up the unit at a trail.

#### **Fire Effects Monitoring Methods**

Three different monitoring methods were used on the different land ownerships as the AFR Fire Effects Monitoring Method had not yet been standardized across the AFAR landscape at the time of installation of pre-burn monitoring plots. All methods include a relatively small sample size but were thoughtful in their installation to attempt to represent the variety of vegetation, fuels and topography within the units. They were analyzed as logically as possible to laterally compare the data between all of the units, however metrics were not completely standardized between methods so some data may not be equally comparable. Footnotes in summary tables indicate differences.

#### *AFR Monitoring Method*

An established fire effects monitoring method directly tracks the standard set of AFR-partnership prescribed fire and resource objectives listed above (page 2). Each objective is linked to a specific monitoring indicator recorded in pre- and post-burn plots, with additional metrics to characterize the unit or inform fire or smoke modeling and repeat photographs to document fire effects. This method was developed by TNC with input and refinement from the other AFR partners ([Perchemlides 2018](#)). Monitoring plots were 1/10<sup>th</sup> acre, circular, and distributed throughout the units to capture the range of fuels, topographic settings, stand types, and fire effects (Map 1). Pre-treatment plot data were collected shortly before the burns, followed by records of fire weather, behavior, and ignitions pattern during the burn. Post-burn data and photos were collected in the early fall following the burn to allow time for tree mortality and ground cover conditions to develop. During-burn records were compiled from Forest Service staff, FEMOs and TREX FEMO trainees to complete records of burn operations listed below in the

implementation summary. Post-burn unit walk-throughs were used to assess objectives not captured at the plot scale, and to verify that plot data were adequately representative. Burn unit perimeters were also GPS-mapped in after the burns.

#### *LRP Forest Inventory Method*

These forest inventory plots, developed by LRP and TNC ([LRP 2018](#)), were installed in EPPB1 and COA burn units in Spring 2017, one year prior to the burns. Plots were sampled with a fixed-radius, 1/10<sup>th</sup> acre in size, with 1/50<sup>th</sup> acre nested regeneration plots. The data were collected to evaluate treatment effectiveness at the site level as well as model the landscape scale changes in potential fire behavior resulting from the collective treatments on all AFAR projects. Data collected included measurements of tree density and composition, canopy cover, shrub cover, ladder fuels, fuel model, legacy tree encroachment, and first order fire effects. Plots were distributed systematically across the treatment areas to establish a baseline inventory and were re-measured again in the Fall after the burn to be consistent with the AFR Method. All five plots on EPPB1 were burned but only two of the five plots installed in the COA B3/E1/B4 unit fell within in the final burned area (Map 1).

#### *COA Composite Burn Index Method*

The fire effects monitoring for the City of Ashland was implemented by Small Woodland Services, Inc. that developed a monitoring protocol using three types of assessments:

1. Composite burn index (CBI)
2. Pre and post burn fuels and soils data
3. Post-burn fire-related tree condition, decline and mortality

Fuel and soils monitoring were collected one-month post burn while the CBI assessment, tree condition, and additional soils monitoring was taken five-months post burn, in this case it was in the Fall after the burn. The CBI method (Key and Benson 2006) was used to evaluate first order fire effects on understory and overstory conditions based on a severity scale ranging from 0 (unburned) to 3 (high severity). Stand exams were measured to account for snags, tree regen, fuels, soils, and vegetation cover. Additional data was collected in the Fall using 20 BAF variable radius plots evaluating tree and needle mortality, and decline. Six of these plots were sampled within the area burned.

### **Monitoring Results and Performance on Objectives**

Overall, surface and understory fuels were reduced while maintaining soil stability and overstory and legacy trees among 126 acres of Federal, City, and private properties as detailed below. Table 3 presents monitoring results relative to AFR objectives across all units and for each unit individually. The AFR objectives are also the burn plan objectives for the Forest Service units. Tables 4 and 5 summarize performance on objectives for the EPPB1 and COA units, respectively, based on their specific burn plan objectives. Table 6 presents a CBI burn severity summary for the COA unit from independent monitoring.

When all units were cumulatively analyzed in terms of the 2018 AFR Prescribed Fire Objectives, all objectives were obtained across the four units for surface fuels, shrub and tree mortality/retention and soil stability with the exception of Objective #7 pertaining to snag and large downed wood retention (Table 3). The only unit that achieved that objective was EPPB1. That objective was assessed for AFR and EPPB1 in a post-burn walk through. The lack of consistent wet periods in the winter prior to burning arguably reduced the fuel moisture in the snags and large downed wood, leading to their increased

consumption during the burns. The snags that fell during or post-burn contributed new large downed wood, to some extent replacing what was consumed.

In general, the AFR burn thresholds allow for a wider range of fire effects than the EPPB1 and COA objectives do (Tables 3, 4, 5) often allowing for somewhat higher intensity fire. For instance, on the COA unit, most surface fuels were reduced more than intended in the unit-specific burn objectives, except the 1- and 10-hour fuels, which kept just within the threshold with 67% reduction under a 70% limit (Table 5). However, when evaluated under the AFR partnership objectives surface fuel consumption remained well within the acceptable range. Overstory tree and legacy tree retention as well as soil stability goals were met across the board for all units and all sets of objectives. Fuel models also consistently transitioned from heavier to lower loads with most areas switching from a TL3 to a TL1 (Table 2).

Generally, fire effects in AFR 4a and COA B3/E1/B4 were somewhat more intense than the other two units. The steep, exposed ridgelines, located on strategic landscape positions for reducing fuels, in 4a and the COA unit experienced higher fire behavior, even with slow and conservative lighting techniques. These units had the highest percent of the area burned (Table 2) and did not achieve expected retention of understory shrubs and trees (Table 3). The COA unit also fell just outside the target threshold for intermediate tree mortality, consistent with the borderline moderate CBI rating for the unit (Table 6). The only overstory mortality on COA B3/E1/B4 was on some mid-sized madrones (Main, 2018). Recorded mortality is estimated from crown scorch one season post-burn and does not directly capture long term effects. Both 4a and COA were burned at the end of the Spring prescribed burn season with their fine fuel moistures dropping to the minimum prescribed within the burn plan at the end of the last day of burning (Appendix B, May 14), contributing to these more intense effects. Both these units exhibited steeper slopes, more so than the rest of the units, increasing the potential for crown-heating and understory mortality.

Fire effects in AFR 4a varied substantially across the unit, based on landscape position. The shaded draws and NE aspects, which often still had green understory fuels, burned with less intensity. Also, the substantial presence of unburned handpiles in 4a contributed to an increase in fire intensity requiring slow ignitions, especially at the top of the unit.

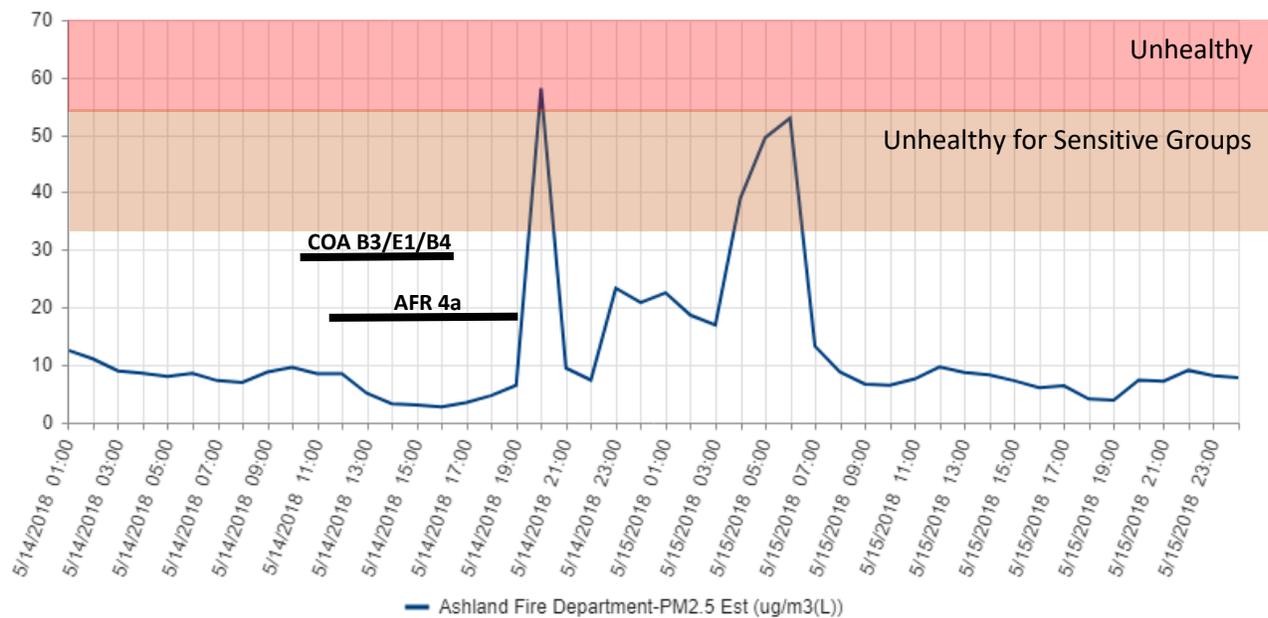
AFR 7c exhibited minimal fire effects despite stacked lighting patterns to increase fire intensity. The thin, sparse fuels and the cool and cloudy weather conditions contributed to only 34% of the unit area burning (Table 2). It also did not reach the intended reduction in fine fuels with 18% reduction (Table 3). The fire only seemed to burn well in areas of continuous pine litter, which was patchy throughout the unit. However, estimated snag and large wood retention did not reach the conservative target as assessed in the post burn walk through.

The EPPB1 burn maintained low intensity fire effects, reducing litter and light surface fuels by 40%, retaining 100% of the overstory and the most understory, effective ground cover, snags, and down wood – more than any of the other units (Table 3). Extensive site prep, careful selection of burn windows earlier in the season, and thoughtful lighting pattern and pace contributed to these desirable outcomes for the EPPB1 unit.

The Fisher block located on the edge of unit 4a was the only designated wildlife leave area in any of the four units. Operations in 4a maintained low intensity fire effects in this Fisher block due to both its

landscape position at the bottom of a damp draw with high canopy cover and careful ignitions. Ignitions attempted to allow fire to creep in without direct ignition, but some limited dot firing was done. There were no perennial streams in any of these units.

Smoke was successfully kept out of Ashland, the nearest Smoke Sensitive Receptor Area (SSRA), with a single exception. A moderate smoke intrusion was recorded in Ashland in the evening of May 14 and into the early morning hours of May 15. The maximum PM2.5 recorded in Ashland was 58.1  $\mu\text{g}/\text{m}^3$  at 20:00 on May 14 (Figure 1). The smoke was contributed from two burn units after the last of the acreage on AFR 4a and the COA B3/E1/B4 were burned. Ignitions were not complete on AFR 4a until 1800, and 1500 for COA. Diurnal winds started drifting residual smoke downslope and down-canyon into Ashland between 1900 and 2000. Forecasted onshore flows did not develop the strong northwesterly and upslope winds that were predicted in the afternoon. Residual smoke from heavy fuels burning through the night continued to contribute smoke after ignitions ceased (Smoke Intrusion/Impact Report, 2018).



**Figure 1.** Nephelometer data displaying PM2.5 readings at the Ashland Fire Department during the burn period and resulting smoke intrusion into the SSRA. The intrusion lasted 13 hours the night after burn units AFR 4a and COA B3/E1/B4 were completed. Solid black lines indicate duration of ignitions for each of the burn units.

*Photo (right) of smoke observations AFR 4a Day 1: 5/12 at 1530 show light smoke slightly lifting and drifting southeast*



**Table 3.** Summary of monitoring results for achieving burn objectives relative to the AFR 2018 Prescribed Burn Objectives. The totaled results are area-weighted to reflect the overall objective attainment across the four units burned in the AFR/AFAR project area in 2018. Cell colors indicate attainment based on identified objectives: green = achieved objectives; yellow; borderline; orange = did not achieve objectives; grey = objective not evaluated

#	Objective	Target	Total	AFR 4a	AFR 7c	EPPB1	B3/E1/B4
1	Reduce litter and light surface fuels (1-100-hr)	30% - 80%	62%	67%	18%	40%	72%
2	Retain shrubs and understory trees (<5" DBH)	>30%	51%	16%	62%	88%	10% <sup>3</sup>
3	Limit mortality of intermediate trees (5-12" DBH)	< 40%	13%	25%	0%	0%	44% <sup>3</sup>
4	Retain dominant/codominant trees (>12" DBH)	> 90%	98%	96%	100%	100%	98%
5	Retain legacy trees: conifers >30" hardwoods >20" DBH	>97%	99% <sup>4</sup>	99% <sup>4</sup>	99% <sup>4</sup>	n/a	n/a
6	Retain overall effective ground cover for the relevant slope and year post-burn	> 60% yr-1 (< 35% slope)	97%	n/a	n/a	97%	n/a
		> 70% yr-1 (> 35% slope)	93%	90%	96%	99%	72% <sup>5</sup>
7	Retain large down logs and snags (> 20" DBH)	> 90%	69% <sup>4</sup>	50% <sup>4</sup>	80% <sup>4</sup>	99% <sup>4</sup>	n/a
8	Minimize intensity in leave areas; limit crown scorch	<20%	15%	15%	n/a	n/a	n/a
9	Retain duff & coarse wood next to perennial streams	50' buffer	n/a	n/a	n/a	n/a	n/a

<sup>3</sup> Value based on the LRP monitoring data (n=2) as this data was not specifically measured in the COA CBI Method that included higher plot density.

<sup>4</sup> Metric not quantitatively measured this year in the monitoring method; results reported from post-burn field observations.

<sup>5</sup> Value measured using the COA method of measuring pre and post burn soil cover percentage on permanent 50' transects; it is not directly comparable to the Effective Ground Cover method under the AFR Monitoring Method used to evaluate soil stability in the other three units.

**Table 4.** Summary of monitoring results for EPPB1 based on the Prescribed Burn Objectives listed in the burn plan. Objectives 1, 4, and 5 were not specifically measured in the monitoring method.

#	EPPB1 Burn Objective	Target	Results
1	Return low intensity fire as an ecosystem process.	Low	not measured
2	Reduce 1 and 10-hour fuels (0"-1")	30% - 60%	40%
3	Reduce 100-hour fuels (1"-3")	20% - 50%	
4	Reduce 1000-hour fuels (3" - 9")	< 20%	not measured
5	Reduce 10,000-hour fuels (> 9")	< 5%	not measured
6	Maintain existing overstory trees by limiting overstory mortality, including hardwoods	0% - 1%	0%
7	Maintain existing effective ground cover of litter/duff by leaving part of the unit area in unburned mosaic pattern from ignition	25% - 40%	25%

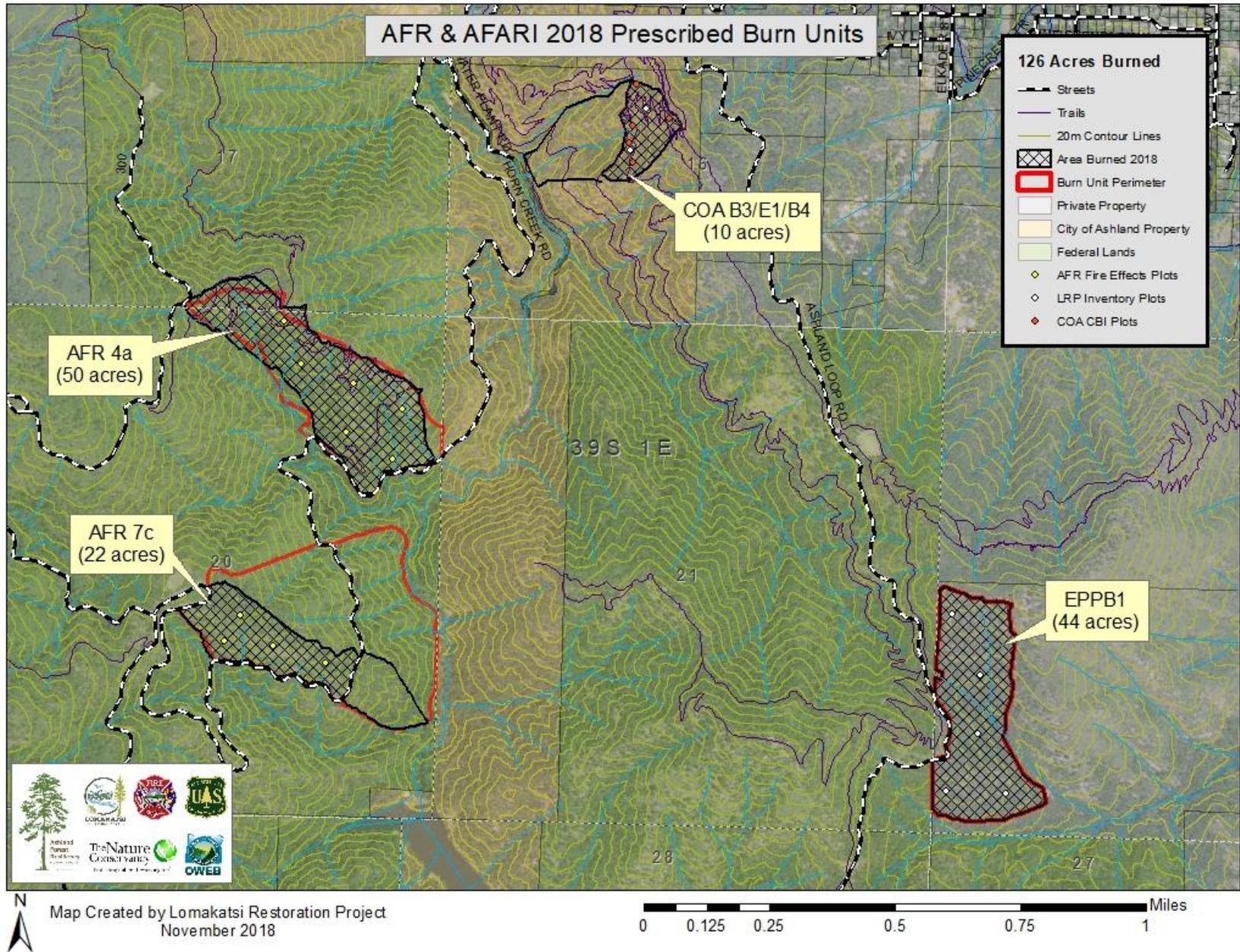
**Table 5.** Summary of monitoring results for the COA unit B3/E1/B4 burn based on the Prescribed Burn Objectives listed in the burn plan and analyzed with the COA Composite Burn Index method and pre and post-burn measurements of permanent transects.

#	Objective	Target	Results <sup>1</sup>
1	Return low intensity fire as an ecosystem process.	Low	Low to Moderate
2	Reduce 1 and 10-hour fuels (0"-1")	40% - 70%	67%
3	Reduce 100-hour fuels (1"-3")	20% - 50%	75%
4	Reduce 1000-hour fuels (3"-9")	< 30%	43%
5	Reduce 10,000-hour fuels (> 9")	< 20%	59%
6	Maintain existing overstory trees by limiting conifer overstory mortality	0% - 5%	0%
7	Minimize potential for soil erosion by:		
	Leaving part of the unit in an unburned mosaic pattern	10% - 40%	13%
	Limiting the increase in bare soil	< 25% 2-yrs post burn	TBD

<sup>1</sup>Results for the entire 28-acre unit will be reported after prescribed underburning of the remaining 18-acres of the unit, planned to burn in Spring 2019.

**Table 6.** Composite Burn Index (CBI) rating summary from COA B3/E1/B4, measuring Objective #1 for that unit. CBI categories: Minimal evidence = <0.5, Low severity = 0.5-1.5, moderate severity = 1.5-2.5, and high severity = >2.5. Total CBI was scored on the very low end of moderate with the understory rating moderate and the overstory being low (Main, 2018).

Understory CBI	Overstory CBI	Total CBI
2.01	0.95	1.52



**Map 1.** Units burned in the AFR/AFARI footprint in 2018 including burns on Forest Service (AFR), City of Ashland (COA) and private property. Red lines indicate initial planning boundary of the prescribed burn unit; thick black lines show planned control line unit layout; thin black hashing indicates actual area burned. Plot locations are displayed for the three different methods that were utilized in the fire effects reporting.

## Appendix A Prescription Parameters

### AFR Prescription Parameters (Marshall et. al. 2016)

1. Environmental Prescription	Acceptable Prescription Range			Outside area at critical holding point  minimum acceptable moisture
	Low Fire Intensity	Desired Fire Intensity	High Fire Intensity	
Temperature (°F)	45-55	56-75	76-86	
Relative humidity (%)	45-35	34-25	24-20	
Mid-flame wind speed	0-3	4-7	8-12	
Wind direction (azimuth°)	N,W,E	N,W,E	N,W,E	
1-hr fuel moisture (%)	15-13	12-10	9-7	7
10-hr fuel moisture (%)	17-15	14-12	11-9	9
100-hr fuel moisture (%)	19-17	16-14	13-11	11
1000-hr fuel moisture (%)	>20	19-17	16-14	14
Live fuel moisture (%)	N/A	N/A	N/A	N/A
Duff moisture (%)	N/A	N/A	N/A	N/A

### EPPB1 Prescription Parameters (Murphy et. al. 2018)

Weather & Fuel Moisture Elements	Acceptable Prescription Range*			OUTSIDE AREA AT CRITICAL HOLDING POINT  MINIMUM ACCEPTABLE MOISTURE
	LOW	DESIRED	HIGH	
TEMPERATURE (F°)	55	65	75	
RELATIVE HUMIDITY (%)	65	45	30	
MIDFLAME WIND SPEED (MPH)	2	5	8	
WIND DIRCTION	NW-N-NE	NW-N-NE	NW-N-NE	
1-HOUR FUEL MOISTURE (%)	12	8	7	7
10-HOUR FUEL MOISTURE (%)	14	10	9	8
100-HOUR FUEL MOISTURE (%)	20	18	16	14
1000-HOUR FUEL MOISTURE (%)	28+	24	22	22
LIVE FUEL MOISTURE (%)	250	250	250	200+
DUFF FUEL MOISTURE (%)	Moisture Evident	Moisture Evident	Moisture Evident	
SOIL MOISTURE (%)	Moisture Evident	Moisture Evident	Moisture Evident	

COA B3/E1/B4 Prescription Parameters (Murphy et. al. 2017)

Weather & Fuel Moisture Elements	Acceptable Prescription Range*			
	LOW	DESIRED	HIGH	
TEMPERATURE (F°)	55	65	75	OUTSIDE AREA AT CRITICAL HOLDING POINT
RELATIVE HUMIDITY (%)	65	45	30	
MIDFLAME WIND SPEED (MPH)	2	4	8	
WIND DIRCTION	Upslope, NE-E	Upslope, NE-E	Upslope, NE-E	MINIMUM ACCEPTABLE MOISTURE
1-HOUR FUEL MOISTURE (%)	8	7	6	6
10-HOUR FUEL MOISTURE (%)	10	9	8	8
100-HOUR FUEL MOISTURE (%)	18	16	15	15
1000-HOUR FUEL MOISTURE (%)	28+	24+	22+	22
LIVE FUEL MOISTURE (%)	250	250	150	150+
DUFF FUEL MOISTURE (%)	Moist	Moist	Moist	
SOIL MOISTURE (%)				

## Appendix B Weather Tables

\*Indicates time of test fire. Measurements that went out of prescription are *italicized and underlined*

### AFR 4a Day 1: 5/12/2018

Time	Aspect	Temperature (°F)	Relative Humidity	Wind Direction	Wind Speed (gusts)	Fine Dead Fuel Moisture		Probability of Ignition		Notes
						Exposed	Shaded	Exposed	Shaded	
1045*	E	59	45	NW	1-3	<u>7</u>	11	40	20	Test Fire: 1100
1130	E	55	<u>66</u>	NW	2-3	9	13	30	20	
1200	E	55	<u>66</u>	NW	2-4	9	12	30	20	
1230	E	57	<u>62</u>	NW	2-4	8	11	40	20	
1300	E	58	<u>63</u>	NW	1-3	8	11	30	20	
1330	E	62	48	NW	1-3	9	10	50	30	North Line
1400	E	65	46	NW	1-3	8	11	40	20	West Line
1430	E	66	<u>63</u>	NW	0-2	9	12	30	20	West Line
	E	64	45	NE	2-6 (8)	9	12	30	20	South Line
1500	E	65	42	SE	2-4	<u>7</u>	10	50	30	South Line
1600	E	63	53	E	0-2	10	11	30	20	South Line
1630	E	64	41	E	0-2	9	10	30	20	South Line

**AFR 4a Day 2: 5/13/2018**

Time	Aspect	Temperature (°F)	Relative Humidity	Wind Direction	Wind Speed (gusts)	Fine Dead Fuel Moisture		Probability of Ignition	
						Exposed	Shaded	Exposed	Shaded
1100*	E	63	49	N	0-2	8	12	40	20
1130	E	64	57	E	2-4	8	12	40	20
1200	E	66	51	Upslope	2-4	<u>7</u>	10	50	30
1230	E	70	42	E	2-4	6	9	60	30
1300	E	71	43	E	2-4	6	9	60	30
1330	E	70	46	E	2-4	<u>7</u>	10	50	30
1400	E	69	41	E	3-5	9	10	50	30
1430	E	72	40	E	2-5	9	10	40	30
1500	E	73	38	E	3-5	9	12	40	40
1530	E	76	31	E	2-4	9	12	40	40

**AFR 4a Day 3: 5/14/2018**

Time	Aspect	Temperature (°F)	Relative Humidity	Wind Direction	Wind Speed (gusts)	Fine Dead Fuel Moisture		Probability of Ignition	
						Exposed	Shaded	Exposed	Shaded
1000	S	65	49	E	1-2 (4)	<u>7</u>	11	50	50
1100*	SE	67	41	SE	3-4 (8)	<u>6</u>	9	60	30
1200	SE	68	34	SE	0-3	<u>5</u>	8	60	40
1300	SE	71	23	SE	0-2	<u>5</u>	<u>7</u>	70	50
1400	SE	73	21	SE	2-3	<u>4</u>	<u>6</u>	70	50
1500	SE	75	21	SE	1-2 (7)	<u>4</u>	<u>6</u>	70	50
1600	SE	76	25	SE	1-2 (7)	<u>5</u>	<u>7</u>	60	50
1700	SE	76	22	SE	1-2 (6)	<u>5</u>	<u>7</u>	60	50
1800	SE	78	21	SE	1-2 (5)	<u>7</u>	8	50	40

**AFR 7c 5/10/2018**

Time	Aspect	Temperature (°F)	Relative Humidity	Wind Direction	Wind Speed (gusts)	Fine Dead Fuel Moisture		Probability of Ignition	
						Exposed	Shaded	Exposed	Shaded
1100	E	50	69	NW	3	10	13	30	20
1200	SE	53	65	NW	2 (4)	10	13	30	20
1300*	SE	54	60	NW	light (4)	8	11	40	40
1330	SE	50	63	N	light (3)	8	11	50	50
1400	SE	50	62	N	light (3)	8	11	50	50
1430	SE	52	58	N	light (3)	9	12	40	40
1500	SE	52	57	N	light (3)	9	11	30	40
1530	SE	52	57	N	light (5)	9	11	30	40
1600	SE	50	57	N	4 (9)	9	11	40	40
1630	SE	52	52	N	light (5)	8	11	40	40
1700	E	52	49	N	light (3)	8	11	30	20
1730	SE	54	49	S	light (3)	8	11	30	30

**EPPB1 Day 1: 4/23/2018**

Time	Aspect	Temperature (°F)	Relative Humidity	Wind Direction	Wind Speed (gusts)	Fine Dead Fuel Moisture		Probability of Ignition	
						Exposed	Shaded	Exposed	Shaded
1100*	S	66	<u>29</u>		6	<u>7</u>	9	50	30
1200	S	66	<u>29</u>	ESE	7	<u>6</u>	9	50	30
1300	S	70	<u>20</u>	SE	6	<u>4</u>	<u>7</u>	70	50
1400	S	72	<u>25</u>	SE	6	<u>5</u>	8	60	40
1500	S	73	<u>25</u>	SE	7	<u>5</u>	8	60	40

**EPPB1 Day 2: 5/7/2018**

Time	Aspect	Temperature (°F)	Relative Humidity	Wind Direction	Wind Speed (gusts)	Fine Dead Fuel Moisture		Probability of Ignition	
						Exposed	Shaded	Exposed	Shaded
830	S	53	82	N		14	15	10	10
900	S	55	77	NW	2	13	14	20	10
945	S	55	77	N		13	14	20	10
1030	S	56	77	N		11	14	20	10
1100*	S	60	75		1-2	11	14	20	10
1140	S	59	48			8	11	40	20
1200	S	61	69			9	12	30	20
1230	S	64	57			8	11	40	20
1300	S	67	55			8	11	40	20
1330	S	66	54			<u>7</u>	10	50	30
1400	S	71	50			<u>7</u>	10	50	30
1430	S	70	49			<u>7</u>	10	50	30
1500	S	73	48			<u>7</u>	10	50	30
1530	S	75	59			8	11	40	30
1600	S	75	42			<u>7</u>	10	50	30
1630	S	72	44			<u>7</u>	10	50	30

**EPPB1 Day 3: 5/8/2018**

Time	Aspect	Temperature (°F)	Relative Humidity	Wind Direction	Wind Speed (gusts)	Fine Dead Fuel Moisture		Probability of Ignition	
						Exposed	Shaded	Exposed	Shaded
900	SE	69	62	NW	0	<u>7</u>	10	50	30
1000	SE	62	63	NW	0	<u>7</u>	10	50	30
1100*	SE/NE	67	55	NW	1-2	<u>6</u>	9	40	30
1200	SE/NE	68	56	NW	1-2	<u>6</u>	9	40	30
1300	SE/NE	68	52	NW	1-2	<u>6</u>	9	40	30
1400	SE/NE	68	48	NW	1-2	<u>6</u>	9	40	30
1500	SE/NE	65	58	NW	2-5	<u>6</u>	9	40	30
1600	SE/NE	65	62	NW	2-5	<u>6</u>	9	40	30

**COA B3/E1/B4 5/14/2018**

Time	Aspect	Temperature (°F)	Relative Humidity	Wind Direction	Wind Speed (gusts)	Fine Dead Fuel Moisture		Probability of Ignition	
						Exposed	Shaded	Exposed	Shaded
930*	W	63	57			13	13	20	20
1100	W	69	55	NE	light	11	12	20	20
1130	W	74	42	NE	light	9	10	40	30
1200	W	<u>77</u>	40	NE	1-3	7	9	50	30
1300	W	<u>81</u>	31	E	2-4 (7)	<u>6</u>	8	60	40
1400	W	<u>85</u>	<u>25</u>	E	2-4 (8)	<u>3</u>	<u>6</u>	90	60
1500	W	<u>84</u>	<u>24</u>	E	2-4 (7)	<u>3</u>	<u>6</u>	90	60
1600	W	<u>83</u>	<u>24</u>	NE	1-3	<u>3</u>	<u>7</u>	90	50

## Appendix C Timeline of Operations

### AFR 4a Day 1: 5/12/2018

Time	Operations and Observations Timeline
1030	Briefing at the end of FS 300 Rd by RXB2(t) Paul for burning AFR Unit 4a. All resources were assigned to either holding, firing, or FEMO. Weather, objectives, communication, and operations plans were reviewed.
1057	Test burn started at the highest point of the unit, northwest corner below 300 Rd, elevation 3,600' with 40% average slope and SE aspect. Fire weather conditions being Temp: 54°F, RH: 61%, with variable northern winds; PIG 40% shaded and unshaded (weather was taken by kestrel). Fire behavior observations showed good consumption with pine needle and leaf litter as the main carrier, flame lengths of 1' to 2', a depth of 2', heading ROS 1.5 ch/hr.
1059	Ignitions continue with two lighters, one on northern line and one on southern line, initiating a backing fire using dot-dash ignition with 5'-10' spaced dots with 10' line spacing.
1115	Added two more burners, one to each side as the landscape distance increased. The four lighters used a bump float ignition pattern using the same dot-dash ignition with 20 spacing between lighters, continuing to coordinate with each other and fire boss, with slow progression downslope.
1133	Shifting winds were reported at the test fire sight, fire boss stop ignition for the fire intensity to slow.
1141	Fire boss commence ignition to continue with the same pattern.
1211	Topography diversifies, slowing downslope progress. Lighters hit the newly installed Wonder Trail, which starts on north line and wasn't laid out on the map unit.
1247	Holding & fire bosses communicated and coordinated the critical areas that needed to be covered as the unit becomes wider.
1328	Smoke: light grey color with some black puffs, lifting about 1000' AGL, mixing and heading ESE towards Lithia Park, driven by increasing NW winds
1345	Another lighter added to ignitions crew as unit gets wider
1530	Large snags igniting in interior of unit
1540	Smoke: light grey color with some black puffs, lifting about 1000' AGL, mixing and heading SE
1548	Dot ignitions in madrone litter through retention skip
1637	Cease ignitions; 8 acres burned. Checkline installed on north line connecting holding line and the trail; no line installed on south line - allow the fire to back down overnight
1720	AAR

**AFR 4a Day 2: 5/13/2018**

<b>Time</b>	<b>Operations and Observations Timeline</b>
1035	Briefing at the end of FS 300 Rd. again by RXB2(t) Paul: All resources were assigned to either holding, firing, or FEMO. Weather, objectives, communication, and operations plans were reviewed. Weather predicted to be hotter and drier with the similar winds; thermal trough bringing predicted thunderstorms from the south; 70% RH recovery occurred the night before.
1101	Test burn was lit on northside handline (Avenza Map location, Lat. N 42.17129 W 122.72441). Favorable weather and fire behavior showed good fuel consumption.
1103	Ignitions continued with same ignition pattern as the previous day with 4 lighters using dotting and dot-dash firing ignition spaced 10'-25' apart and lighters bump floating with 40' spacing.
1115	Southern part of the line was held up for the northern side to get more depth down the unit.
1117	Smoke: Light grey, lifting 500' AGL and heading south; moderate mixing.
1123	Smoke darkening to a dark grey
1128	Ignitions hold to fall snag on N line. Southern part of the lighters had to mitigate around the "Fisher Block" area.
1138	Ignitions continue
1207	Topography diversifies with multiple ridges running through the unit. Two lighters added to tighten up spacing between lighters. Winds primarily slope drive but shifting gusts coming from the north.
1228	Fire backing in litter and 10-hr fuels; FL: 0.5'-1', ROS: 1ch/hr, scorch height <15'
1254	RXB2 transitions from Rob Marshall to Ruth Johnson.
1315	South side not burning well (wetter, green fuels in draw bottoms), North side consuming well on ridge
1327	Ignite piles on South side and allow to back from them; 1 lighter added to ignitions crew
1334	FIRB(t) transitions from Manuel Sharp to Justin Corns
1507	Ignition complete for the day all personal are on patrol until flame activity decreases. Bx2(t) takes back burn boss role and looks for updates on unit progress.
1510	Ignition complete; 16 acres burned (24 acres of 55 acres burned in unit so far). All resources are on stand-by until lower fire intensity.
1512	Small group torching near North line
1621	AAR

**AFR 4a Day 3: 5/14/2018**

<b>Time</b>	<b>Operations and Observations Timeline</b>
1025	RXB2(t) transitioned from Jonathan Paul to Rich Howe. Howe gave a full briefing and did not change any of the group's operations.
1100	Test burn on the northside handline (Avenza Map location, Lat N 42.16983 W 122.72131) with elevation of 3,410, SE aspect and >30% slope. Weather conditions and fire behavior showed Temp: 70°F, RH: 49%, east winds 1-4 mph, 50% PIG shaded/unshaded. Fire was backing in needle and broadleaf litter with FL: 1'-1.5', ROS: 0.5 ch/hr, 3' scorch height. Test fire again showed good consumption and displaying to meet objectives, ignition would continue with the blacklining operations.
1105	FIRB(t) had three burners on the northern side and two burners working the southern side.
1115	Southern side held up to mitigate slop-over from roll-out the night before allowing the north side to catch up.
1133	Winds increasing from the east as forecasted
1215	Winds continue to slightly increase, eastside fire behavior having more activity.
1300	More lighters added to help cover the unit as it gets wider at the bottom.
1400	A steady wind from the east of 4-5 mph with gust of 7 mph was observed on northern lower third and some areas experience 12 mph gusts. Fire behavior was still in desirable conditions and acceptable ROS and fire intensively but resulted in northern ignition group for slower progress and precautions.
1430	Winds continued to be steady 4 to 5 mph from the east experiencing gust around 6 to 8 mph, burn group continuing with slow progress downslope.
1500	South line has made it to bottom Horn Creek Rd., and FIRB plans to have a lighter on each of the four internal ridgetops to strip fire down the ridges, allowing fire to back into the draws. Lighters on the south continue bump floating above the road to the ridge lighters with dot-dash ignitions.
1540	Burn operations continue; winds are at steady 3 to 5 mph gust of 7 mph.
1846	Ignition complete; 31 acres burned (55 acres total).
1925	AAR - initial fire effects observed fulfill objectives

**AFR 7c 5/10/2018**

<b>Time</b>	<b>Fire Behavior &amp; Operations</b>
1300	Test fire flanking and backing through madrone litter with FL: 0.5' and ROS 1 ch/hr
1305	Continue ignitions with stripping head fire ignition pattern and 4 people lighting
1330	Fire carrying through pine litter. Heading and flanking fire exhibiting FL: 1'-2' and ROS: 2 ch/hr and backing fire exhibiting FL: 1' and ROS 1 ch/hr. Mild scorch in madrone saplings observed.
1400	Firing pattern decreased spacing and increased speed to increase fire behavior
1416	Higher consumption observed in areas with open canopy FL: 3'. Good scorching of madrone saplings.
1440	Fire behavior increased with steeper slopes and exposure to a south aspect; fire heading through pine litter FL: 4', ROS: 7 ch/hr
1600	Firing pattern reconfigured to a parallel contour with 7 lighters
1630	Fire heading through madrone litter FL: 3', ROS: 6 ch/hr
1720	Fire not backing continuously through litter, mostly heavier fuels burning

**EPPB1 Day 1: 4/23/2018**

<b>Time</b>	<b>Operations and Observations Timeline</b>
845	Hose lay installed
1030	Briefing
1100	Test Fire in NE corner of the unit
1145	Ignitions continue
1230	Headstrip complete
1400	Desirable fire effects, fuels burning in mosaic
1500	Allowing fire back to the road
1530	Cease ignitions: 4 acres burned

**EPPB1 Day 2: 5/7/2018**

<b>Time</b>	<b>Operations and Observations Timeline</b>
1030	Briefing at green gate (private property/FS boundary) by RXB2 Tim Henigan: Weather, objectives, communication, hazards, PIO plan, and operations plans were reviewed.
1055	Test Fire - Fire backing in pine litter FL: 0.5'-1' ROS: 1-2 ch/hr. Will need to force the headstrip but meet objectives
1100	Continue ignitions with 4 lighters (2 above road, 2 below) using dash-dot firing pattern. Smoke mixing and heading South
1117	Ignitions continue above the road; low fire behavior on West flank in the shade
1130	Higher fire behavior with some Doug-fir reprod consuming on East flank
1430	FL: 2'-3' ROS: 1ch/hr
1630	Cease ignitions: 15 acres burned

**EPPB1 Day 3: 5/8/2018**

<b>Time</b>	<b>Operations and Observations Timeline</b>
1000	Briefing by RXB2 Ryan Watkins
1100	Test Fire. Head strip FL: 1'-2' ROS: 1ch/hr
1115	Ignitions continue with 4 lighters bump floating. Smoke rising 1000' heading SE
1400	Dot ignitions FL: 2'-3' ROS: 1ch/hr. Smoke rising 2000' heading SE
1530	Started to drizzle, added 2 lighters and started stripping - meeting objectives. FL: 2'-3' ROS: 1ch/hr
1600	Ignitions complete: 25 acres burned

**COA B3/E1/B4 5/14/2018**

<b>Time</b>	<b>Operations and Observations Timeline</b>
900	Test fire backing fire FL: 0.5'-1' (maximum flame lengths of 2') ROS: 0.5-1 ch/hr. 100-hr fuel moistures were low (9%), but accepted
1000	Ignitions continue with 4 lighters stripping 5'-8' apart with same fire behavior as test fire
1500	Ignitions cease because slow progress throughout the day (from low fuel moistures and steep terrain) indicated inability to complete unit by the end of the day and there was a trail to stop it on

## Appendix D Pre-Burn and Post-Burn Plot Photos

AFR 4a



*An exposed ridge with residual activity fuels pre-burn showing snag, large downed wood, shrub and intermediate tree mortality post-burn.*



*Photos located near a draw bottom show a lower load of ground fuels with higher fuel moistures and lower intensity fire effects.*

**AFR 7c**



*Minimal fuel consumption in closed canopy Douglas-fir and madrone litter.*



*Moderate fuel consumption in open canopy pine litter.*

**EPPB1**



*Moderate consumption of surface fuels (bottom of the unit).*



*Moderate consumption of fine fuels and top-kill of sprouting madrone (mid unit).*



*Exposed slope with heavier fuels showing slightly higher consumption of surface fuels (top of the unit).*

*EPPB1 smoke observations on 5/7 at 1245 show light smoke lifting and heading SE*



**COA B3/E1/B4**

*High consumption of surface fuels leaving exposed soil and scorching intermediate and overstory madrones. Note top-kill of madrone resprout ~6' tall with resprouting already reinitiated.*



*Overall sparse fuels result in low to moderate intensity fire effects but pockets of denser fuels from remnant activity fuels (right side of photos) led to scorching of overstory madrone.*



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