Ashland Forest Resiliency Project 2020 Prescribed Burn Fire Effects Monitoring Report

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Units: AFR Underburn Unit 5c
Burn Date: 2/26/2020
Acres Burned: 65 acres
Fuel Types: Timber litter, Timber understory
Main Fuel Models: TL3, TU1
Burn Boss: Robert Marshall, Forest Service, SMRD
FEMO: Keith Perchemlides, TNC

This report documents 2020 prescribed fire objective accomplishment to inform adaptive management of future burns for the Ashland Forest Resiliency (AFR) project, a partnership of the U.S. Forest Service (USFS), City of Ashland (COA), Lomakatsi Restoration Project (LRP), and The Nature Conservancy (TNC). It covers USFS underburn Unit 5c in the Ashland, Oregon watershed, Siskiyou Mountain Ranger District (SMRD), Rogue River Siskiyou National Forest. Total acres burned in 2020 were limited due to the COVID-19 pandemic. AFR prescribed burns are intended to meet both fire management and ecological goals by reducing fuel loads and fire risk, and by reintroducing beneficial fire for forest restoration while protecting sensitive wildlife habitat. Prescribed burning in 2020 met these landscape-scale goals as well as specific burn objectives for retention of mature trees, habitat features, and soil-protecting ground cover. Prescribed fire objectives for this burn are summarized in Table 1 and defined in the 2017 AFR Group 2 Burn Plan.

Unit Description

The perimeter of Unit 5c was formed by FS Roads 2060 and 300 along the north edge and AFR Unit 4a (burned 2018) to the east; the unlined southern perimeter paralleled a tributary of Ashland Creek about 300-400 ft upslope (Map 1). Unit aspect is predominantly E/SE, with a smaller western portion facing SW. Stands are mixed Douglas-fir, white fir, and Ponderosa pine with madrone common and abundant, dominate in some areas. Prior to burning, the unit was thinned and pile-burned for density and surface/ladder fuel reduction, leaving relatively open stands and sparse understory. Pre-burn fuel models were typically TL3 with areas of TU1 and TL8. About 30 of the 95 acres originally planned for 5c were left unburned along the downslope southern edge (Map 1). The excluded portion is characterized by higher stand density and fuel moistures, plus widespread unburned fuel piles left from previous thinning.

Burn Implementation and Fire Behavior

The Unit 5c burn was led by Forest Service staff and completed in a single day during a winter dry weather window in late February. TNC and LRP staff were not available to conduct during-burn FEMO monitoring. At the time of reporting, documentation of burn operations, fire weather, and smoke and fire behavior are not available.

Fire Effects Monitoring

We were not able install pre-burn plots for Unit 5c. Monitoring results reported here are based on post-burn plot data recorded in October 2020, with pre-burn conditions estimated from evidence on-site and referencing photographs taken at the plot locations just prior to the burn. Our monitoring otherwise followed established AFR/AFAR methods detailed in the AFR 2017 Fire Effects Monitoring Method. To track the success of burns relative to prescribed fire objectives, each objective is linked to specific monitoring indicators measured in plots distributed across the unit to capture the range of fuels, topographic settings, stand types, and fire effects (Map 1). Post-burn data and photos were collected in the fall to allow time for tree mortality and ground cover conditions to develop. We used post-burn unit walk-throughs to assess objectives not captured at the plot scale and to verify that plot data are adequately representative. The final perimeter of the unit was GPS-mapped post-burn with acres completed calculated in GIS.

Monitoring Results and Performance on Objectives

Table 1 provides a summary of fire effects monitoring results relative to burn objectives. The Unit 5c burn met all objectives with one exception, understory mortality was marginally higher than the target range. Objectives for reducing surface fuels while limiting tree mortality and retaining large logs, snags, and effective ground cover were well within target ranges. The fire was patchy with only about three-quarters of the area within the completed unit (black crosshatch, Map 1) effectively burned; on the downslope third of the unit and on shaded aspects, carry and consumption from ignitions was limited. Fire intensity was low within the one Fisher block (objective 8) in the completed unit as evident from minimal crown scorch and limited surface fuel consumption. Higher residual moisture in larger fuels and duff during this winter burn likely benefited the retention of large down logs, snags, and ground cover, and minimized heat impacts on live trees. The completed unit did not contain perennial streams (Map 1), so objectives 9, intended to minimize impacts to riparian habitats, was met by default.

Active fire in Unit 5c generated enough heat to kill most of the understory in the unit reducing the live understory cover just below the retention limit (objective 2). Understory cover includes all shrubs except groundcover species and trees < 5" DBH – except madrone re-sprouting from fire damage are not included in our post-burn understory cover. With intensive pre-burn thinning of surface and ladder fuels, understory cover in the unit was very low before the burn at only about 3%. Given the sparse pre-burn understory, a loss of only about 2% actual cover resulted in a high proportional loss of over two-thirds of the understory from burning. It is inherently difficult to achieve a burn that effectively reduces surface fuels while retaining live understory cover. This requires controlling the intensity of the burn within a tighter range than required for either objective alone. Greater retention of understory during pre-burn thinning may help fire managers retain a higher proportion and diversity of live understory during burns.

Our monitoring found one incident of legacy tree mortality in the 5c burn. A > 30" DBH Ponderosa pine apparently burned out at the base and fell when fire got inside the bole from an existing basal burn scar. No other legacy tree mortality was observed in the unit and the burn meets objective 5 for legacy tree retention.

In addition to measurements directly linked to objectives, our monitoring tracks change in the type and loading of surface fuels by assigning Scott and Burgan fuel models at each plot before and after the burn. These fuel models can then be used to estimate fire behavior under a range of potential fuel moisture and fire weather conditions (Table 2). Our methods for selecting fuel models and estimating fire behavior are detailed in the Local Ashland Area Fuel Model Photo Guide. Prescribed burning led to substantial reductions in estimated flame length and rate of spread, especially for fires burning under "extreme" conditions (very low live and dead fuel moisture, and 15 mph winds) – see Table 2.

Table 1. Summary of burn objective accomplishment for AFR Unit 5c. Fire effects solidly within the target range are highlighted green and marginal results yellow. Footnotes provide relevant details on measurement and calculation.

Burn date	2/26/2020
Unit acres	65
Primary aspect	SE
Average % slope	60%
% of unit area burned	77%
% Canopy closure pre-burn	72%
% Canopy closure post-burn	72%
FEMO monitoring sample size	6 plots

Burn Objectives Unit 5c: 2017 Group 2 FS SMRD Burn Plan	Target	Result
1. Litter and light surface fuel (1 - 100 hour) reduction [1]	30% - 80%	**61%**
2. Retain cover of understory tree (< 5" DBH) and shrub [2]	> 30%	**28%**
3. Limit intermediate tree (5 - 12" DBH) mortality [3]	< 40%	**0%**
4. Retain dominant/ codominant trees (> 12" DBH) [3]	> 90%	**100%**
5. Retain conifers > 30" DBH and hardwoods > 20" DBH [4]	> 97%	**~ 99%**
6. Retain effective ground cover target by slope and year [1]	> 70% yr-1 (> 35% slope)	**91%**
7. Retain large down logs or snags (> 20" diameter) [4]	> 90%	**> 95%**
8. Minimize fire intensity (as crown scorch) in leave areas [4]	< 20%	**< 10%**
9. Retain duff and coarse wood next to perennial streams [5]	50' buffer	**n/a**

Footnotes:

1 - Includes post-burn litter-fall from scorched canopy as 1-hour fuels and ground cover.

2 - Reported as percentage of the pre-burn cover remaining post-burn, excluding understory cover from re-sprouting madrone.

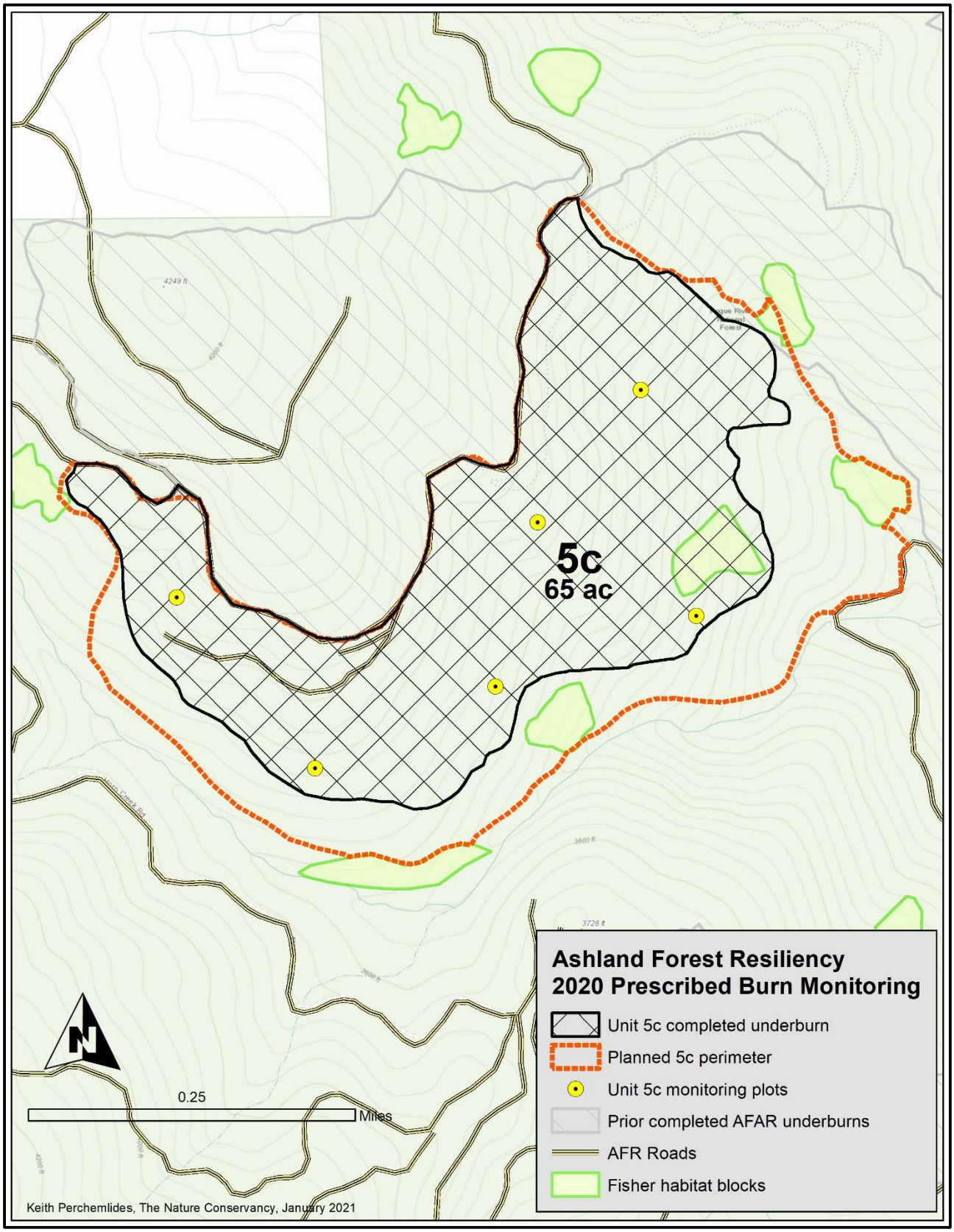
3 - Post-burn mortality field-interpreted as trees with > 95% crown scorch; may underestimate actual mortality rates.

4 - Legacy mortality, large log/snag retention, and fire intensity in leave areas field assessed during post-burn walk-through; percentages are estimates, not based on plots or inventory.

5 - Completed unit boundaries were greater than 50' from perennial streams.

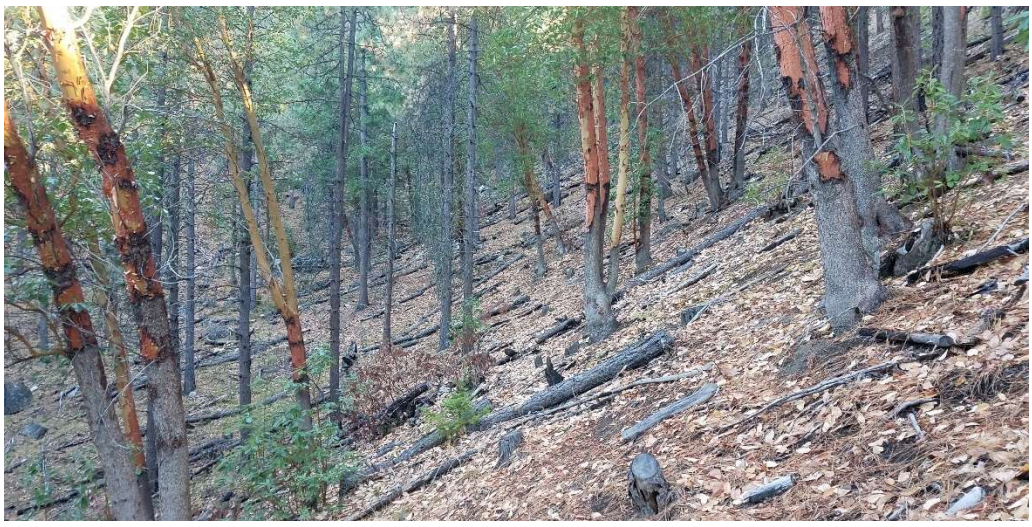
Table 2. Estimated fire behavior as flame length (feet) and rate of spread (chains per hour) for fire under mild or extreme conditions and based on plot-level fuel model assignments. Methods and assumptions for these fuel-model-derived fire behavior estimates are detailed in TNC's 2020 Local Ashland Area Fuel Model Photo Guide.

Fire behavior estimates for mild or extreme fire conditions	Flame Length (ft)		Rate of Spread (ch/hr)	
	Mild	Extreme	Mild	Extreme
Pre-burn average	1.4	3.5	2.5	12.8
Post-burn average	0.8	1.4	1.3	3.3
Change from fuel reduction	***-0.7***	***-2.1***	***-1.2***	***-9.5***

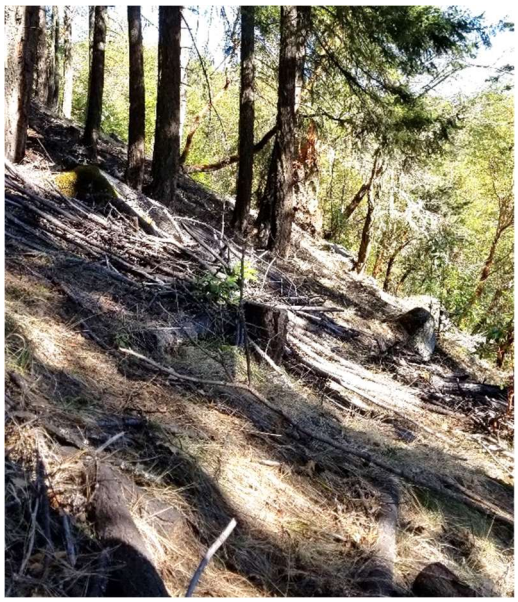


Map 1. Final perimeter and acres completed for AFR 2020 prescribed burn Unit 5c (black crosshatch) with the planned unit perimeter (red dashed), forest roads, streams, and topography. Adjacent burns completed in 2018 and 2019 are shown in grey. Interior and nearby Fisher block leave areas are green. The lowest portion of 5c bounding the tributary to Ashland Creek was planned but not burned, likely due to high fuel moistures and the presence of widespread unburned fuel piles from prior thinning. Yellow circles show locations of 2020 fire effects monitoring plots providing the data for this report.

Representative before-and-after fire effects photographs from AFR underburn Unit 5c:



Before (top) and after (bottom) photographs showing reduction of small diameter surface fuels, litter, and understory trees/shrubs without overstory mortality. Seasonal litter-fall augmented by crown scorch has created a new light covering of litter in the post-burn image (bottom).



Repeat photographs showing pre-burn surface fuel accumulations (left) reduced by burning (right) in AFR Unit 5c.