

# **West Mountain Fire**

## **Smokey Bear Ranger District, Lincoln National Forest**

**August 13, 2023 – August 25, 2023**

**Prepared by: Apache Kid Wildland Fire Module**



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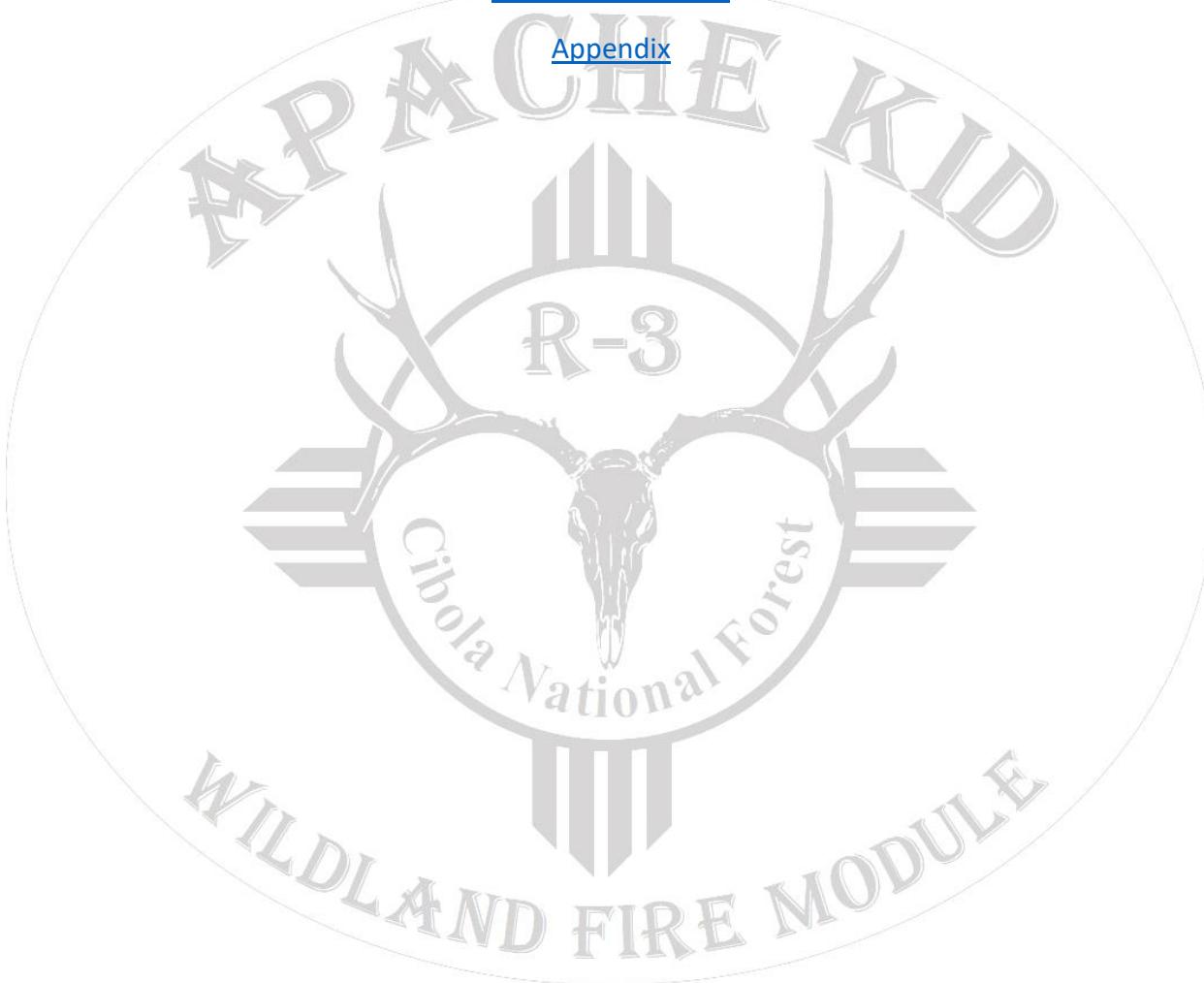
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## Introduction

On August 3<sup>rd</sup>, 2023, the West Mountain Fire had burned 212 acres within the planned management perimeter and was 625 acres by August 25<sup>th</sup>, 2023. This report covers the operational, fire behavior, fire effects, and weather observations made on the incident by Apache Kid Wildland Fire Module from August 13, 2023 to August 25, 2023. Despite challenges to firing operations presented by monsoonal moisture patterns, we show achievement of low to moderate intensity fire effects in treated areas consistent with the management goals articulated in the initial decision to manage the fire.

The West Mountain Fire planning area is bordered on the north by the Forest Service property boundary, on the east by Forest Roads 56, 5643, and 616, on the south by dozer line around private property and along road 142, and on the west by a mix of dozer line and forest roads 401 and the 9031D. The area overall is generally characterized by pinyon-juniper (PJ) woodlands (FM2) in the lower elevations (on the north and south sides of West Mountain) and by Ponderosa pine stringers (FM9) in the drainages and higher elevation portions of the planning area. There are also some mixed conifer stands on the tops of the ridges on West Mountain. Additional features of interest include part of the Peppin Fire that burned in 2004. This burn scar featured a significant resurgence of dominant oak brush and juniper species along with patchy grass. Ponderosa seedlings and saplings were present, but in insufficient numbers to contend with the more dominant species mentioned. Historic and pre-historic archeological sites had also been identified in the area.

As a managed fire, operations on the West Mountain Fire aimed to restore fire's natural role in the ecosystem with the introduction of low to moderate intensity fire on the landscape while protecting resource values such as archeological sites. In particular, there was a focus on maintaining low to moderate intensity fire in the Ponderosa to preserve the stands' overall integrity while reducing large dead and down and overall ground fuel loading. Conversely, in the areas of PJ encroachment and within the Peppin Fire burn scar, desired fire effects included consumption of brush and juniper as well as heavy dead and down. Archeological sites were protected as needed utilizing handline constructed with minimal impact suppression tactics (MIST) under guidance from local archeologists.

## Implementation

Firing was completed utilizing hand ignitions. Some days, rain and lightning hampered ignitions and limited burn opportunities.

- 8/13: Firing personnel brought fire down a dozer line on the NE corner of the fire. After ignitions were tied into a dozer check line, additional dozer line was prepped.
- 8/14: The morning had consistent light rain, but this precipitation cleared up in the early afternoon. The 5463 road was prepped from the 5643/dozer line junction heading south. No burn operations occurred. Five photo plots sites were selected and pre-fire photos were taken.
- 8/15: Firing personnel initiated the test fire at approximately 0900 on a check line that was constructed north to south connecting into an east to west dozer line south of drop point 10. The fire effects observed were less than desirable and the firing operation was postponed until 1030 hrs. The test fire was initiated a second time at 1030 hours and subsequently postponed due to increasing cloud cover over the area leading to a loss of fire effects. At this stage of the firing operation, fire personnel had made limited progress and reached the junction of the dozer line and the 5643 road. The firing operation was resumed at 1300 along the 5643 road heading south to drop point 30. This was short lived however, as thunderstorms developed over the fire area and the firing operation was completed for the day at 1400 hours.
- 8/16: Crews completed prep between DP 50 and DP 40 as well as along the dozer line extending westward around the private property. No burn operations occurred.
- 8/17: A test fire was initiated at 0921 hours. The fire effects observed were less than desirable and the firing operation was postponed. At 1032 hours, the firing operation was resumed along the 5643 road to the south. Firing personnel were able make good progress beyond drop point 30, but due to increasing thunderstorms over the ignition area, the firing operation was held up on the M check line and ended at 1230 hours.
- 8/18: Prep continued along the 5643 and 56 roads, as well as the dozer line around the private property on the southeast side of the fire. No burn operations occurred.
- 8/19: Burn operations occurred from the M check line south to about  $\frac{3}{4}$  of the way through the Peppin Fire burn scar and was checked up overnight in an area of patchy fuels within that burn scar.
- 8/20: Crews prepped where dozer pushed north of the power lines along the 142 road, along the 401 road, and an archeological site on the south side of the fire. No burn operations occurred.
- 8/21: Prep along the 5643 was improved while waiting for burn conditions to improve. No burn operations occurred.
- 8/22: Fuels were too wet to burn in the morning due to rain the previous night. A short window of opportunity presented itself from 1500 to 1630 and a few strips were run at the toe of the slope above DP 40. Some hand ignitions also occurred along a few ridges and the tops of drainages interior, along the 9051 road. At 1630 a couple of small storm cells passed over, bringing rain and closing the burn window.
- 8/23: Rain from the previous night and during the day prevented burn and prep opportunities. Some heavy equipment worked near DP 60.
- 8/24: Rain from the previous day and night prevented burn and prep opportunities.
- 8/25: Large dead and down in the interior of the projected fire area along the 9051 road, where hand ignitions had taken place on the ridges on 8/22, were piled to help them consume.

## Fire Behavior

In all four fuel types composing the burn area – pinyon-juniper woodland, Ponderosa pine stand, mixed conifer and burn scar – low intensity fire predominated, with grass and needle cast being the primary carriers of fire. Additionally, 1,000-hr and 10,000-hour fuels burned readily and were observed to be the primary driver of fire intensity (see Fire Effects). A few pockets of moderate intensity fire were observed where continuous ground fuels and heavies were located under brush or ponderosa, but generally poor fine fuel continuity led to mosaic, low-intensity fire throughout the operational periods.

In the pinyon-juniper woodland vegetation regions, fuel continuity was often impeded by a surface layer of diverse large sedimentary rocks, drainage networks, and an exposed sedimentary layer. Rates of spread (ROS) in the woodland vegetation type demonstrated a rate of 2 chains per hour in areas with patchy fine fuel arrangements, whereas in areas of continuous fine fuels, rates of spread were significantly higher at 5 chains per hour. Both areas exhibited predominantly low fire intensity, accompanied by flame lengths ranging from 1 to 3 feet.

Within the Ponderosa pine areas, native grasses were the main carrier of fire. Rates of spread were observed at 4 to 5 chains per hour, with flame lengths of 3 to 5 feet. Fire intensity was variable with low to moderate intensity throughout, with intensity largely determined by the loading of brush, intermixed juniper understory, and heavy fuels in the immediate area. While direct fire behavior observations were not taken during the burning operation that occurred in the mixed conifer, similar fuel arrangements and mosaic fire effects (see below) indicate analogous fire behavior likely occurred.

Fire intensity within the Peppin Fire burn scar ranged from low to moderate, and positive effects were observed, partially due to dead and down woody debris which aided in the elimination of some brush and juniper. *Ceanothus* ssp thickets and grass carried fire well in the burn scar, and areas with continuous loading of these fuels exhibited moderate fire behavior, including torching oak regeneration and juniper, flame lengths of 4 to 5 ft, and ROS of 4 to 6 chains. However, the lack of fuel continuity in many areas of the burn scar led to an overall mosaic pattern.

Smoke throughout the burn operations was white to light gray, had good vertical lift, and was low in volume. It occasionally laid down over the line, but because there was minimal torching of shrubs and young trees, it did not cause holding concerns during any of the burn operations.

## Fire Effects

The application of fire to the landscape presented an opportunity to reintroduce it to areas that had not experienced fire for about two decades, and our observations indicate predominantly positive fire effects were achieved. Overall, heavy dead and down fuels consumed very well wherever fine fuel continuity allowed fire to carry to them, and these fuels in turn often drove the intensity of observed fire effects on larger live fuels in terms of char and scorch heights. A few pockets of moderate intensity fire were found where grass, heavies and brush were located under pole size ponderosa trees, and where *Ceanothus* spp along with grass were found under oak brush in the Peppin Fire burn scar. The moderate intensity areas were small, only a couple of acres at most throughout the fire area.

In the pinyon-juniper vegetation, most areas were characterized by low intensity mosaic fire effects (see [Photo Plot 1](#)). These effects mostly included consumption of the top layer of fine fuels (70%) and low to moderate consumption of understory brush species (30%). Isolated torching and/or complete scorching of junipers and pinons was observed, but overall minimal scorching occurred and when it did (often driven by underlying brush consumption), scorch heights were variable at 3 to 6 feet. Overall, an estimated 25% of 1000-hr and 10,000-hr fuels were consumed in this fuel type, whereas poor consumption was observed in the 10-hr and 100-hr size classes. In areas with more continuous fine fuel loading (see [Photo Plot 2](#)), moderate intensity effects including up to 15 feet of scorching on junipers, gamble oaks, and isolated Ponderosas and char heights averaging 2 feet were recorded. Heavies also consumed better (40% complete, 50% partial consumption) in these areas.

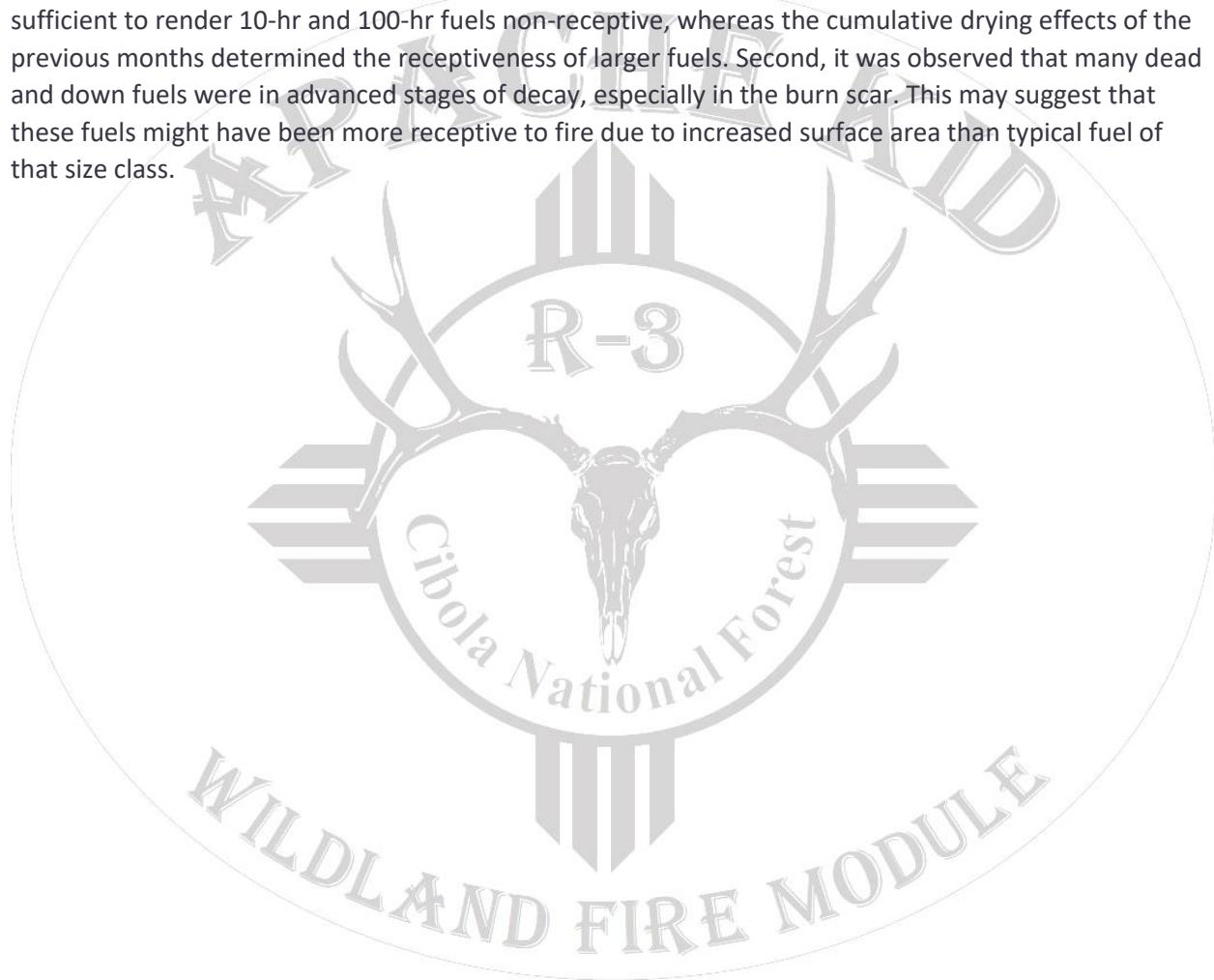
Similarly, the Ponderosa stands experienced mostly low intensity fire (~80% of total stand area, Photo Plots [3](#), [4](#), [5](#)) with a few pockets of moderate intensity fire (~20%), leading to a mortality of less than 10% for mature trees overall. Moderate intensity areas were largely characterized by significant fuel loads of heavy dead and down, which overall consumed very well (50% complete consumption, 20% partial). These fuels, either by promoting torching of the juniper/oak understory or by directly heating the overlying canopy, led to observed scorch heights of 30 to 40 feet and charring of around 5 to 10 feet on affected Ponderosas. While similar percent consumptions for heavy dead and down were observed in low intensity areas, the lower overall loading of these fuels led to lower intensity fire effects including char heights of only 2 to 3 feet, scorching in understory shrubs but not mature trees, and consumption of only the top layer of pine litter. As observed in the pinon-juniper, 10-hr and 100-hr fuels did not consume nearly as well as heavier classes, consuming at around 30%.

The mixed conifer stands up high on the ridges contain an ample amount of Ponderosa in addition to Doug fir, and the fire was low intensity (see [example photos](#)). The fire struggled to carry due to green grass, but where it did carry, 45% of the fine needle cast and 55% of the heavy dead and down consumed. Char height was 3 to 6 feet on Ponderosas, and oak brush scorched up to 6 to 8 ft leading to an estimated 25% mortality of the brush. There were small pockets, less than an acre in size, where slopes greater than 30% aligned with winds leading to crown scorch greater than 70%. In both fuel types that contained Ponderosa pine, there was overall less than 5% mortality of the mature Ponderosa pines in areas that have been treated with fire thus far.

Except in areas along the road where hand ignitions and continuous *Ceanothus* brush and grass produced moderate fire effects, low-intensity fire predominated (75%) in the burn scar due to poor fuel continuity (see [Photo Plot 6](#)) and moderate-intensity fire was observed at 25%. In moderate intensity

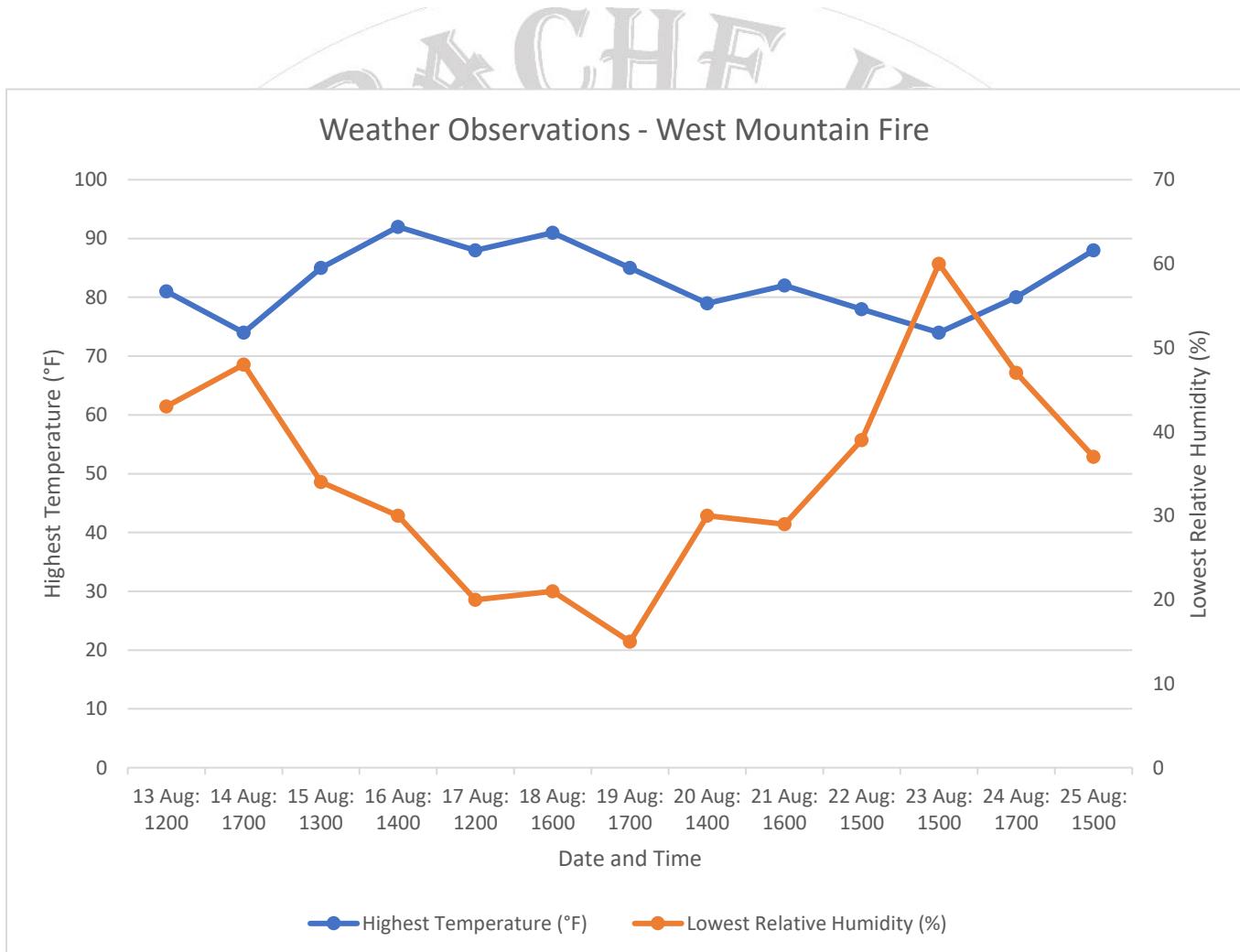
areas, torching of oak brush and juniper was observed with overall brush consumption/mortality estimated at 50%, whereas low intensity areas had brush consumption of only 10%. Heavy dead and down in the burn scar aided with the regeneration consumption, and two-thirds of the heavies themselves consumed in areas of moderate intensity whereas only one-third consumed in low-intensity areas.

Interestingly, 10-hr and 100-hr fuels consumed less efficiently than heavier 1,000-hr and 10,000-hr dead and down in all fuel types. Two factors that may explain this observation: First, monsoonal moisture will significantly affect the fuel moisture content of 10-hr and 100-hr fuels before 1,000-hr and 10,000-hr fuels. Therefore, precipitation amounts received during the operational period may have been sufficient to render 10-hr and 100-hr fuels non-receptive, whereas the cumulative drying effects of the previous months determined the receptiveness of larger fuels. Second, it was observed that many dead and down fuels were in advanced stages of decay, especially in the burn scar. This may suggest that these fuels might have been more receptive to fire due to increased surface area than typical fuel of that size class.



## Weather Summary

Weather conditions played a pivotal role not only in determining the burn window but also in constraining fire effects. The fire area received rain half of the days Apache Kid was assigned to the West Mountain Fire. Monsoonal and tropical storm moisture elevated relative humidity levels and increased precipitation, ultimately moderating fire intensity by elevating fuel moisture content, therefore limiting fire progression and potential burn opportunities.



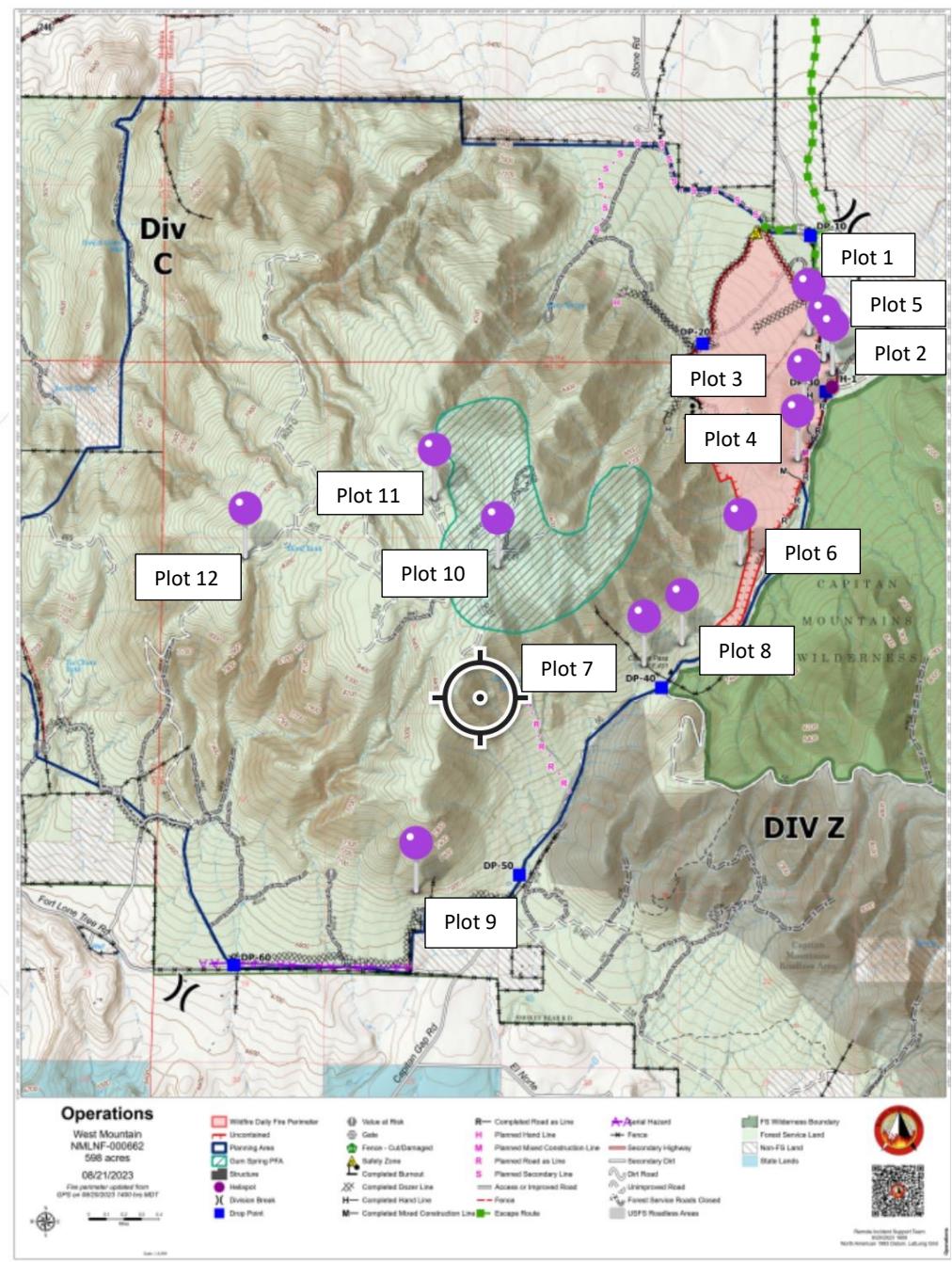
## Conclusion

Managing the West Mountain fire introduced low intensity fire back on to the landscape and resulted in a reduction in ground fuel loading, the elimination of some brush and young juniper, and the preservation of Ponderosa pine stringers. Though the entire planned fire area did not receive fire, much of the prep was completed, which will set the local unit up for success when there is another good burn opportunity in the future.



## Appendix

### Photo Plot Map



### Plot 1

33°39.080' N, 105°27.343' W

Fire only reached approximately ½ of the photo plot.



Pre Fire North



Post Fire North



Pre Fire East



Post Fire East



Pre Fire South



Post Fire South



Pre Fire West



Post Fire West

Plot 2

33°38.883' N, 105°27.202' W



Pre Fire North



Post Fire North



Pre Fire East



Post Fire East



Pre Fire South



Post Fire South



Pre Fire West



Post Fire West

### Plot 3

33°38.683' N, 105°27.372' W



Pre Fire North



Post Fire North



Pre Fire East



Post Fire East



Pre Fire South



Post Fire South



Pre Fire West



Post Fire West

### Plot 4

33°38.457' N, 105°27.407' W

Fire did not burn through the entire plot.



Pre Fire North



Post Fire North



Pre Fire East



Post Fire East



Pre Fire South



Post Fire South



Pre Fire West



Post Fire West

Plot 5

33°38.948' N, 105°27.253' W



Pre Fire North



Post Fire North



Pre Fire East



Post Fire East



Pre Fire South



Post Fire South



Pre Fire West



Post Fire West

## Plot 6

33°37.942' N, 105°27.742' W

Fire only reached about 50% of the plot, showing the mosaic burn pattern in the Peppin Fire burn scar.



Pre Fire North



Post Fire North



Pre Fire East



Post Fire East



Pre Fire South



Post Fire South



Pre Fire West



Post Fire West

## Mixed Conifer Stand Example Photos

33°37.368' N, 105°29.408' W

Note: Fire did not reach planned photo plot.



