

Lake Christine Fire

July 14, 2018

Effects of Prescribed Burn on Lake Christine Fire Spread

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The Lake Christine Fire burned adjacent to Basalt, CO during July 2018. The human caused fire started July 4th at the shooting range and quickly spread across Basalt Mountain causing large scale evacuations in the community. Most of the fire spread was during the day July 4th and with another large run the evening of July 4th. Over the next week and a half the fire continued spreading to the north in the Blue Creek drainage which was affecting homes and powerlines as well as fire strategy and tactics.

Across the landscape the fuel component consisted of extremely fast burning pinyon juniper fuels, stands of decadent oak brush and in the higher elevations... decadent aspen stands and conifer stands consisting of subalpine fir. Each fuel type presented its own challenges and responded to the fire differently.

Upon arriving at the incident during the evening of July 4th with the Incident Management Team (IMT) I immediately noticed a difference in the vegetative component when looking at the west side of Basalt Mountain in the Blue Creek drainage. It appeared that there had been either a previous fire or prescribed burn and I thought that there may be some opportunities for taking actions if the fire were to progress that far. This was about an hour before the fire made its big night time run above El Jebel.

It turned out that the vegetative component that looked different consisted of two prescribed burns that took place in 2007 and 2015 conducted by the Forest Service and BLM. This burn essentially altered the fuel component significantly and resulted in a young stand of oak that was resistant to spread.

The southern end of the burn unit was encountered first by the night time run. It was very obvious the effect the burn had with altering fire behavior. As the fire was making the significant run in the pinyon juniper and progressed up Blue Creek, it was burning extremely fast with a crown fire. Fire intensities varied but 30' -60' foot flame lengths were common with the fire moving at times at 60+ chains/hour (3/4 mile/hour). The fire in the pinyon juniper was a very severe fire as well burning all the vegetation and left quite a bit of white ash indicating severe fire effects. This run had a tremendous amount of energy and it slammed into the oak that was part of the prescribed burn. Normally with the amount of energy being generated by the

crown fire run in the pinyon juniper the fire would have continued into the next fuel type and carried with some intensity and severe effects. This was not the case with the oak stand.

The next morning, I was in the Blue Creek drainage and noticed that the oak stand still had its leaves on it (they were scorched and brown) demonstrating that when the crown fire from the pinyon juniper slammed the oak stand it immediately transitioned to a surface fire and underburned the oak with much lower intensities. I used Behave Plus to determine and compare the amount of energy that was released in the pinyon juniper compared to the oak stand.

Fuel Type	Heat/Unit Area BTU/ft²	Flame Len2th in feet
Pinyon Juniper	2400	30-60
Oak from Rx burn	100	1

By morning the oak stand had burned up the ridge. It is believed that the crown fire below the oak aided by high winds threw hundreds of spots into the oak that burned together with low intensity. Observed spread rates in the pinyon juniper were at times 60+ chains/hr while Behave predicts that spread rates in the oak were 2.5 chains/hr. Analysis shows that the predicted spread rate in the oak matches with what happened on the ground.

It then became clear that as the fire continued progressing to the north over the next week that the fire did not want to burn actively in the oak stand. When fire did enter the oak stand it spread by backing and flanking with low intensities and flame lengths generally less than 6 inches and spread rates of less than 1 chain/hour. This led to some operational decisions and opportunities to develop a strategy to protect the values such as homes and powerlines in the Spring Park Reservoir area.

As the week progressed the fire stayed above the oak in the aspen and conifer stands that did not burn during the prescribed fire operations. For several days the fire progressed north and left a pretty even line of heat that was very visible from a distance. This line of heat was the top of the prescribed burn and the fire was very reluctant to enter the burn. It was very obvious that the prescribed burn in the oak had reduced fuels to a point that the oak did not want to carry fire with any intensity and that the burn had effectively created a very defensible buffer between the fire's edge and the values at risk in the valley bottom.

The burn in effect not only created a buffer, but also created more tactical options for defending the values in the valley in the event of a rare event pushing the fire through the oak stand. Operationally it was recognized that the fire would be relatively slow burning through the prescribed burn and it gave time for firefighters to build contingency lines between the values and the fire's edge. If the contingency lines had to be used the probability of success defending these lines by firing operations or aviation support would be high. These views were shared by the Operations Section Chief, Division Supervisor and the Prescott Hotshot crew Superintendent and all of us recognized the effectiveness of the prescribed burn.

The prescribed burn area was also tested on July 12 when 55 mph wind gusts were recorded at the Crown **RAWS** weather station just south of the fire area. These outflow winds from the

southeast caused the fire to grow to the north in the aspen and conifer stands at the head of Blue Creek by surface spread and torching. The smoke column leaned over the hillside and over the prescribed burn with the oak and took a lot of heat and likely a lot of embers. When the smoke cleared there were a few spots on the top edge of the burn and the fire had progressed above the prescribed burn through the aspen and conifer. This event did not cause any significant growth in the oak stand and it was highly evident that the prescribed burn was very effective at reducing fuels and limiting growth by altering the fire behavior.

I did not see the fuel conditions on the hillside prior to the prescribed burns so I am not aware of exactly what the fuel conditions consisted of. By talking to locals in the area as well as agency personnel and comparing similar vegetative types in the vicinity of the Basalt Mountain area I believe that the vegetative and fuel conditions that would have existed without the prescribed fire would have been much different and hazardous. In all likelihood the evening July 4th run that slammed into the oak on the southern end of the prescribed burn would have burned with much greater intensity and severity due to the increased fuel loading. I also believe that without the prescribed burn the fire would not have stayed as high up on the hill at the head of Blue Creek and would have moved towards the valley bottom within a few days of the initial burn period. This would have put the values and homes in the valley at more risk and the fire would have likely impacted these with the fire moving down off the west side of Basalt Mountain.

In summary the prescribed burns that were conducted in 2007 and 2015 clearly altered the fire behavior of the Lake Christine fire. This placed fewer values at imminent risk and kept the fire higher on the hill. It also created less intense fire behavior and provided more options for firefighters to engage the fire under safer conditions with higher probabilities of success. Had the burn not been conducted, the fire's perimeter would look quite different and more resources would have to be utilized to protect and defend the values in the valley as well as likely having more people evacuated for a longer period of time.

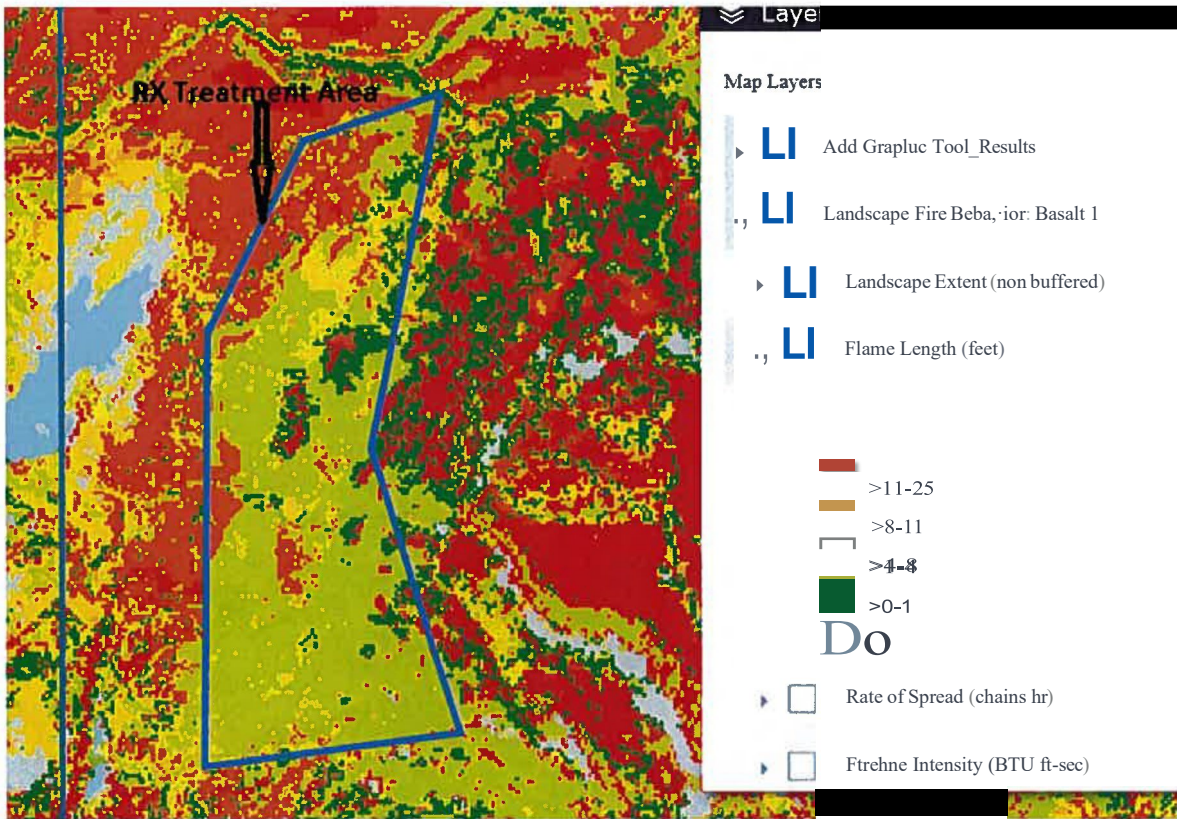
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Photo of Lake Christine Fire along west side of Basalt Mountain in the Blue Creek drainage taken July 14, 2018. The far right of the photo shows the end of the July 4 evening run and the oak stand (yellow arrow) that was underburned altering fire behavior. The white lines show the top of the prescribed burn from 2015 with the oak below it. The fire has stayed above this with minimal operational actions taken on it.



Photo of Lake Christine Fire along west side of Basalt Mountain in the Blue Creek drainage above Spring Park Reservoir taken July 14, 2018. Prescribed fire was conducted in 2015 and the regenerated oak can be seen with the lighter green fuels behind the reservoir. Patches of conifer and aspen did not burn but are carrying fire up higher. Note the line of smoke on the right side of the fire indicating the top of the prescribed burn where the oak starts below it and how the fire is showing resistance to spread in the oak.





Above: IFTDSS Landscape Model run of the prescribed fire area indicates lower flame lengths in

treatment area. This layer derived from LANDFIRE satellite images.



Lake Christine Fire
 Fuels Treatment Effectiveness
 Roaring Fork Prescribed Fire

