



Slide Fire Fuels Treatment Effectiveness Report: Coconino N.F. May 2014



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Introduction:

The Slide fire was a human caused ignition (still under investigation) that began on May 20th, 2014 at approximately 1530 hours. The initial size up of the fire indicated that the fire was located just north of Slide Rock State Park, and that the fire was currently 2 to 3 acres of active fire behavior. Fueled by high winds, the fire quickly grew to over 30 acres triggering immediate evacuations of the communities in Oak Creek Canyon north of Slide Rock State Park.

Fire Environment:

Fire Weather

A high pressure system was settled above the Mogollon Rim for several days prior to the Slide fire ignition. Red Flag weather conditions were present on May 20th and May 21st (day one and two of the fire). Overall, seasonal conditions trend very closely to 2013 with the exception of snowfall. The past winter on the Mogollon Rim was significantly drier than previous years. The National Weather Service Climatology reports 5.83 inches below normal precipitation and only 43% of the normal snowfall received over the winter months. The observations taken from the Flagstaff RAWS at 1300 of May 20th are listed below.

- Maximum Temperature 70°
- Minimum Relative Humidity 8%
- Wind Speed and Direction South at 16 mph

Fuels Conditions

There are two primary vegetative communities impacted by the Slide Fire. First, the area within Oak Creek Canyon and Red Rock Secret Mountain Wilderness is composed of a mix of decadent chaparral fields with riparian ecosystems in the drainage bottom, as well as, stringers of mixed conifer and ponderosa pine on the steep slopes and north aspects. Second, the area on top of the plateau is primarily ponderosa pine with a strong oak component, as well as, mixed conifer on the north aspects.

When looking at the fuel profile of the fire, there is multiple fire regimes represented. The chaparral and mixed conifer ecosystems are adapted to mixed-severity fire on a 30-100 year interval; whereas, the ponderosa pine ecosystem is adapted to a low-severity fire on a 0-30 year interval. The riparian system located in the drainage bottoms of Oak Creek Canyon and the West Fork of the Red Rock Secret Mountain Wilderness is not adapted to fire as the primary disturbance, but has likely experienced past fires due to its adjacent fuel type.

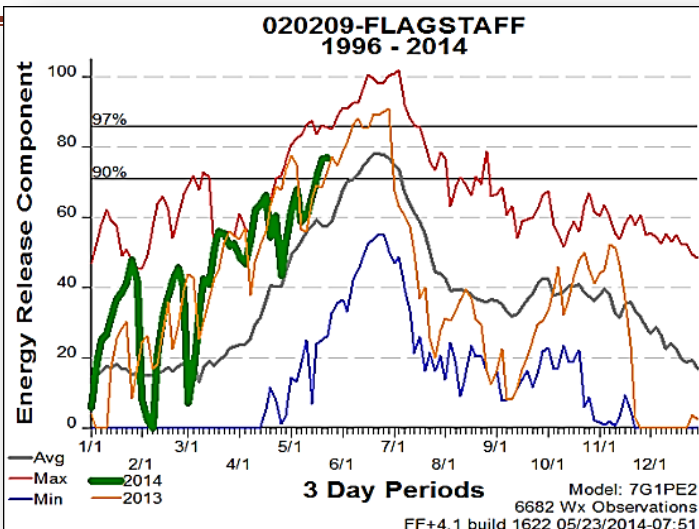


Figure 1: ERC Graph for the Flagstaff RAWS station representing ponderosa pine and mixed conifer fuels

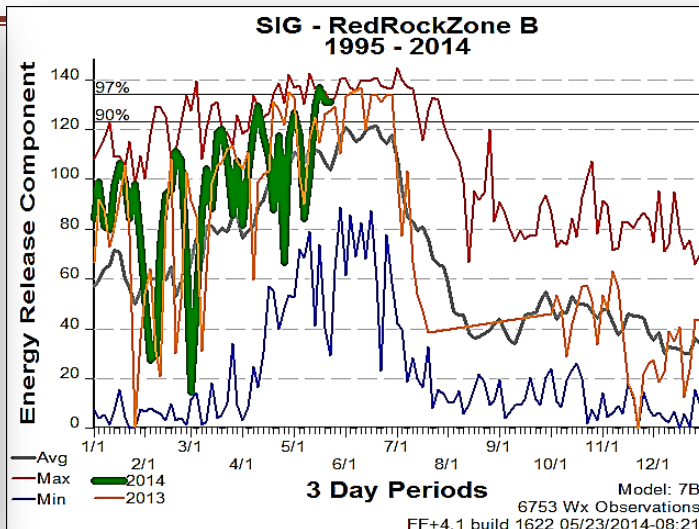


Figure 2: ERC Graph for the Red Rock SIG station representing chaparral and grass fuels.

Live fuel moistures taken just south of the fire origin were 77% for chaparral and 80% for oak (local record lows). On the Mogollon Rim, fuel samples were sampled for ponderosa pine at 90% and Douglas fir was sampled at 97%. For the dead fuels, the 1000 hour fuel samples ranged from 7-10%. Energy Release Component (ERC) taken from a Red Rock SIG (Verde and Cherry Stations) indicates 97th percentile conditions; whereas, the ERC taken from the Flagstaff RAWS station indicates just over the 90th percentile.

Observed Fire Behavior

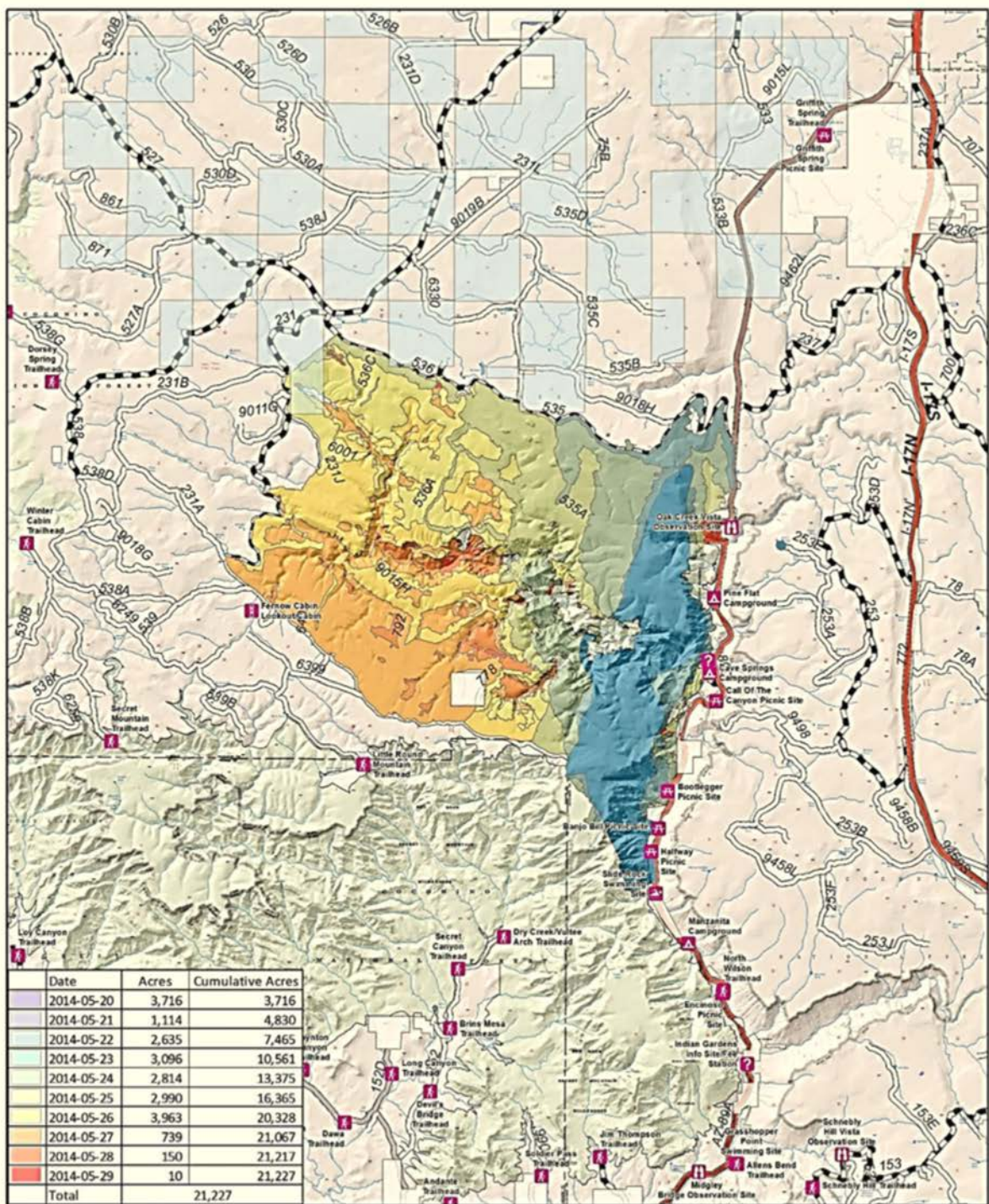
The observed fire behavior during the first two operational periods was very active. Initial attack resources report that the fire burned very active in the chaparral brush fields, but was moderate in the timber stringers. Rates of spread were estimated to be excess of 2-4 miles per hour during the first operational period with 1-2 mile spotting. Map 1 shows the progression of the Slide fire. During the first operational period the fire burned actively ($\approx 3,700$ acres) throughout the entire evening, ultimately spotting into the West Fork of the Red Rock Secret Mountain Wilderness, approximately 4 miles north of the ignition origin. During the second operational period, May 21st, the fire was able to get established in Sterling Canyon. In the afternoon of the 3rd operational period, the fire aligned with slope, wind and fuel type and made an active run towards the burnout containment line on forest road 535. Rick Miller (Flagstaff District FMO) stated that when the fire came out of sterling canyon, they had around 300-500 spot fires over the 535 rd.



Figure 3: Picture showing active fire behavior in the chaparral brush.



Figure 4: Picture showing active fire as a result of 1 to 2 mile spotting from the smoke column.



 **SOUTHWEST AREA TYPE 1
INCIDENT MANAGEMENT TEAM**
TONY SCIACCA - INCIDENT COMMANDER

Slide Fire Progression
Coconino National Forest
May 30, 2014



Map 1: Progression map of the Slide Fire.



Figure 5: Picture showing surface fire behavior, largely the result of timely careful burnout operations.

Looking at the entire fire perimeter, the overall visual assessment is that the Slide fire burned with variable intensity. Largely driven by fuel type, the areas with southwestly aspect and chaparral or brush fuels burned much more actively than the pine and mixed conifer stands. The effect of slope on fire behavior was lessened by the IMTs decision to use ignitions to backfire down slope and minimize high intensity fire. Figure 6 is an aerial depiction of the mixed fire intensity that was observed. The leftmost (east) portion of the photo shows the higher intensity fire that was observed during the first few operational periods.

Fuel Treatment Influence:

The Slide fire perimeter burned a portion of three separate NEPA projects that had hazardous fuels treatments as the primary goal of the implementation. Overall objectives and prescriptions of these treatments vary widely from one another; however, all treatments addressed overstory biomass and most include subsequent prescribed fire. The report will not assess every treatment block separately due to limited confidence and knowledge of the exact location of treatments that occurred prior to 2008. However, every NEPA/project will be incorporated as a subset of the total area treated under the assumption the treatment effects on fire behavior/intensity will be similar per project.

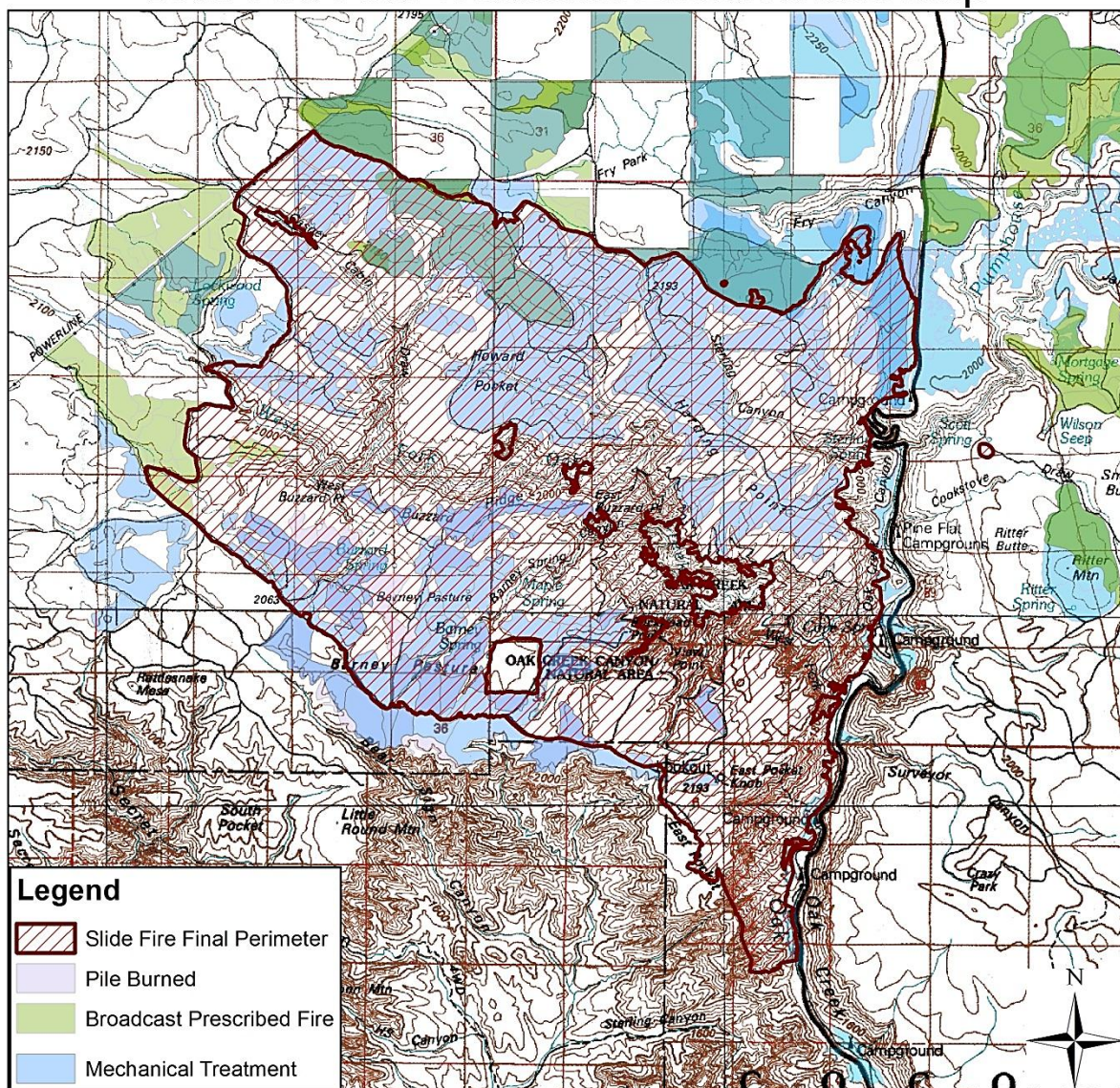
The report is focused on addressing the effectiveness of these hazardous fuel treatments that are less than 10 years old, however, there was added benefit from older timber sales and wildfires that aided suppression efforts and helped moderate fire behavior. These timber sales and past wildfires will also be covered, but in less detail than the hazardous fuel treatments.

On May 23rd, the weather pattern shifted as the high pressure system that was dominating over the fire moved off and was replaced by a weak low pressure system. This weather shift brought higher relative humidity and lower temperatures which significantly reduced fire behavior. The type 1 incident management team (IMT) managing the fire took advantage of these conditions of the following days and continued the burn-out of forest road 535 west to forest road 231 which brought the fire around to the south and east, creating a boundary of existing roads.



Figure 6: Aerial photo showing mosaic burn pattern of low, moderate and high intensity fire. Note: higher intensity burn on the left side (east), where fire was more active in the initial few burn periods. Photo is oriented to face south.

Slide Fire Fuel Treatment Effectiveness Map



Oak Creek Canyon Fuels Reduction

This project emphasized hazardous fuels reduction around the Wildland Urban Interface (WUI). Implementation of the project consisted of removal of all dead trees, brush, and ponderosa pine/Douglas fire <9 inches. Most treatment blocks were then piled and burned to remove the hazardous fuel biomass from the site. Due to the rough, steep terrain inside Oak Creek Canyon, treatment blocks were limited to flatter locations where crews could safely operate. These small “postage stamp” like treatments were strategically placed around the private property to provide 1) lessened fire intensity, 2) more time to implement evacuations, and 3) retain some vegetation, when a fire was to occur. Of these treatments 5 blocks were impacted by the Slide fire, each showing a varied effectiveness in reducing fire intensity/severity.

Slide Rock Block (Directly north of Slide Rock State Park)

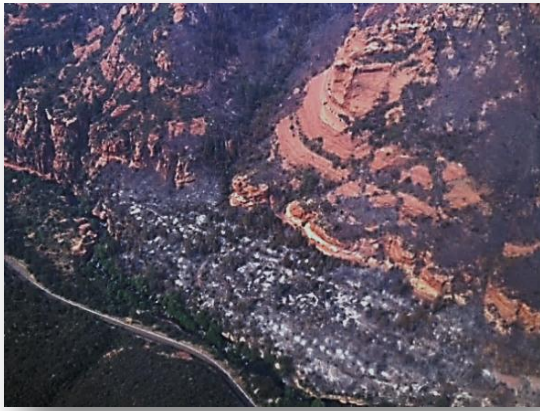
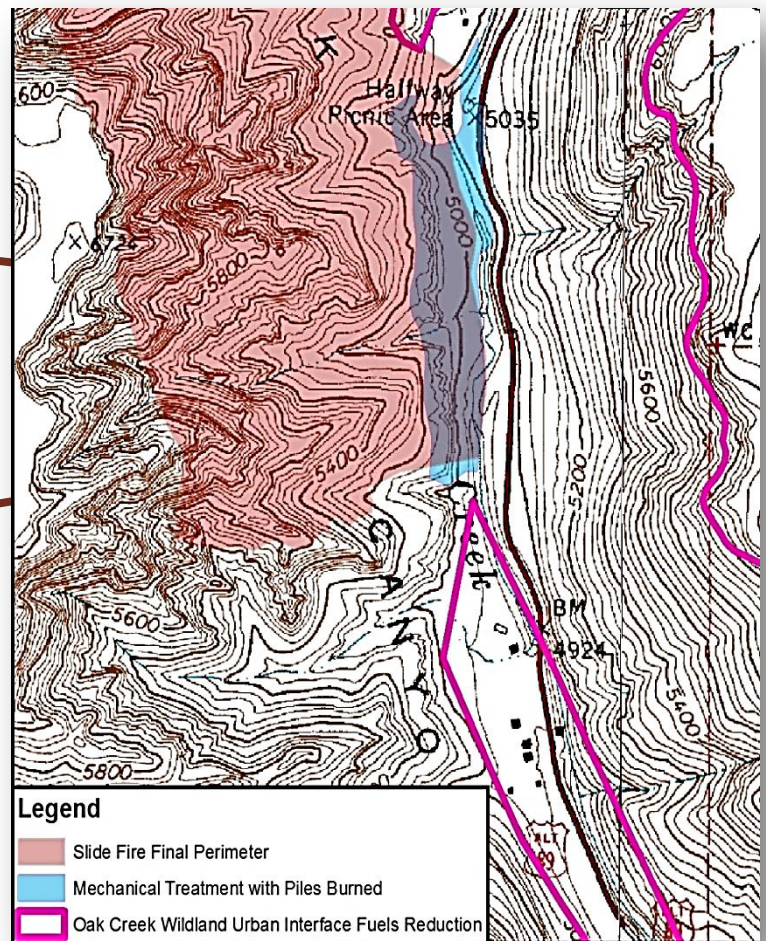


Figure 4: Photo showing aerial view of the treatment area and approximate origin. Fire fighters were able to keep fire west of 89A and Oak Creek largely due to moderated fire behavior in the treatment area.

The Slide Rock block of the Oak Creek Fuels Reduction Project is located just north and west of the Slide Fire origin. The treatment block had been mechanically cut in 2009 and the piles were subsequently burned in 2010.



Travis Mabery the Red Rock District Fuels Technician and IA ICT3 (T) stated that when he arrived on scene, the fire was actively backing through the treatment area. Travis Mabery and the Red Rock Ranger District Fuels AFMO (Scott Spleiss) both describe the pre-treatment conditions as “extremely heavy dead and downed Douglas Fir and Juniper and concentrated so that one could not walk through the area without climbing over downed logs. Due to the observed fire weather and fuels conditions that day, the treatment block did not provide conditions conducive to immediate suppression of the fire. However, the treatment did moderate fire behavior as a result of less hazardous fuel, and allowed residents of Oak Creek Canyon more time to evacuate. In addition, the moderated fire behavior allowed for more direct suppression actions that pushed the fire more west/upslope avoiding canyon/wind alignment that may have allowed the fire to cross highway 89A which would have put the residents and firefighters at greater risk and would have resulted in a much larger fire perimeter. Travis stated that “had the fire burned in this area under pre-treatment fuel conditions, it would have crossed Oak Creek and likely crossed to the east of Hwy 89A”. Flagstaff Ranger District AFMO (Preston Mercer), serving as lookout directly across from the origin on the eastern aspect above the fire, further supports the fuels treatment effectiveness by stating “the smoke was relatively light and grey as the fire burned through the treated area, but became black and thick as it burned into adjacent untreated fuels”.

Banjo Bill Campground Block

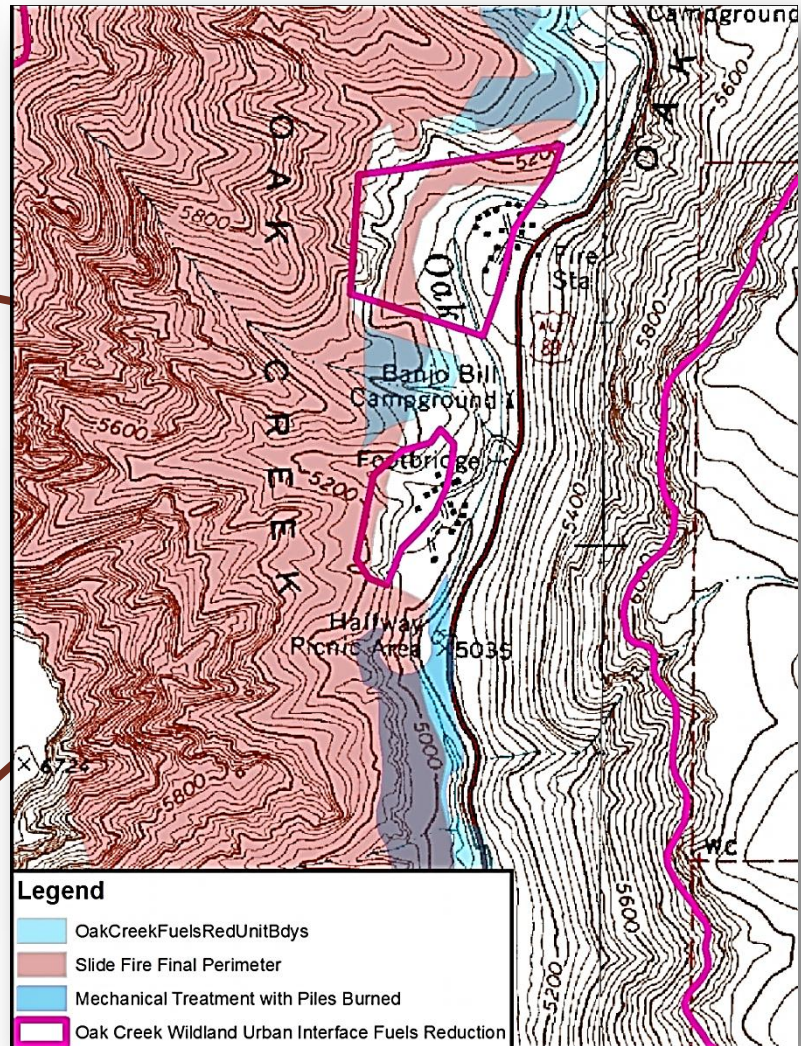
The Banjo Bill block of the Oak Creek Fuels Reduction Project is located just west of the Banjo Bill Campground. The treatment block had been mechanically cut in 2009 and the piles had not been burned prior to the Slide Fire.



Figure 5: Photo of block that was thinned and piled, but the piles had yet to be burned.



Figure 6: Photo showing treatment was less effective in reducing vegetation mortality, yet reduced spotting potential during burnout operations.



Even though the Banjo Bill block had not had its piles burned prior to the Slide fire, there were still added benefits that the treatment offered. The Banjo Bill treatment provided a location where burnout operation could be implemented more safely by reducing spotting potential over the line. The level of structure protection that occurred during the first few burning periods of the Slide fire can be largely contributed to timely and properly executed burnout operations. If the Oak Creek Canyon treatments had not been implemented prior, the success of the burnout operations that were implemented could have been very different. The photos above show that even though the Banjo Bill block still had vegetation piles that had not been burned, there were still less high intensity fire than adjacent fuels. The chaparral regrowth did not fully consume, as did the decadent chaparral stands just upslope from the treatment. In addition, figure 6 shows that some overstory vegetation incorporated within the treatment was retained.

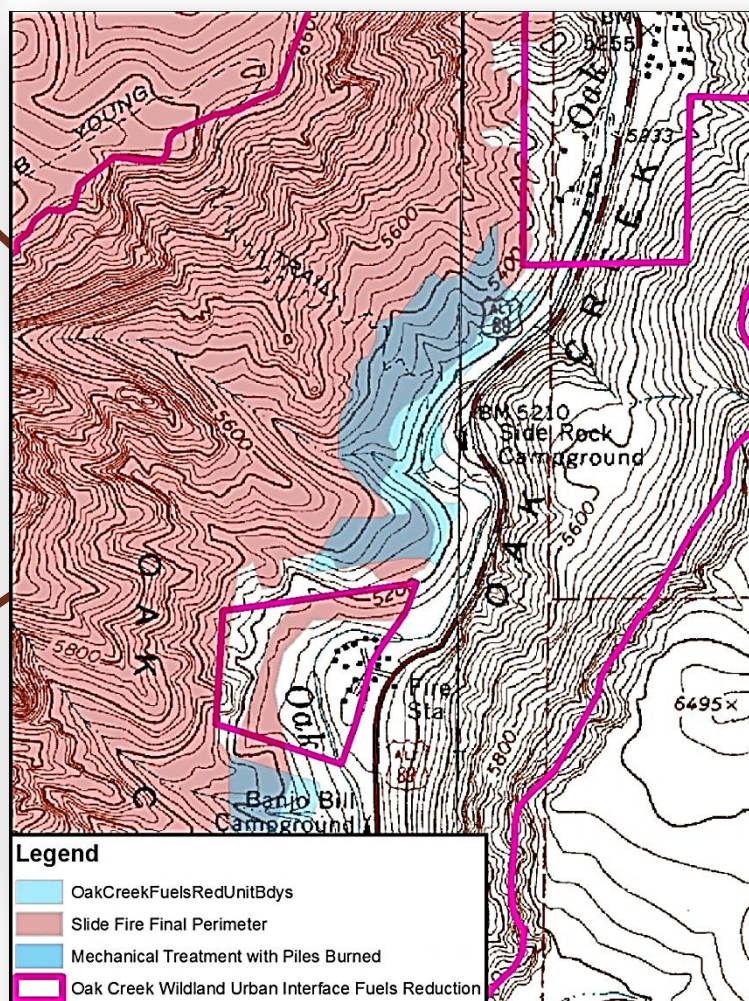
Bootlegger Block



Figure 7: Photo showing brush vegetation was completely consumed; whereas, the timber component is still intact.



Figure 8: Photo showing treatment very effective in reducing fire intensity as the fire backed into the treated area. Most trees remain green.



The Bootlegger block of the Oak Creek Fuels Reduction Project is located just west of the Bootlegger Picnic Area. The treatment block had been mechanically cut in 2009 and the piles were subsequently burned in 2010.

This treatment was one of the largest contiguous blocks of treatments implement in Oak Creek Canyon. Figure 8 shows a stark comparison of treated versus untreated fuels. The power line corridor visible in the photo is the western boundary of the treatment where nearly all vegetation west of the treatment was partially to fully consumed as the fire moved upslope. The area within the treatment not only provided a safer burnout anchor, but also burned under lower intensity, retaining most overstory vegetation. “These vegetation strips will be key to reduce debris flows and sediment transfer during the summer monsoon rainfall” (Scott Spleiss). In addition, these treatment help reduce spotting potential over the control line and near private land to the north and south. If the treatments had not been implemented, there would have been a higher likelihood of the loss of structures resulting from increased ember wash.

Cave Springs Block

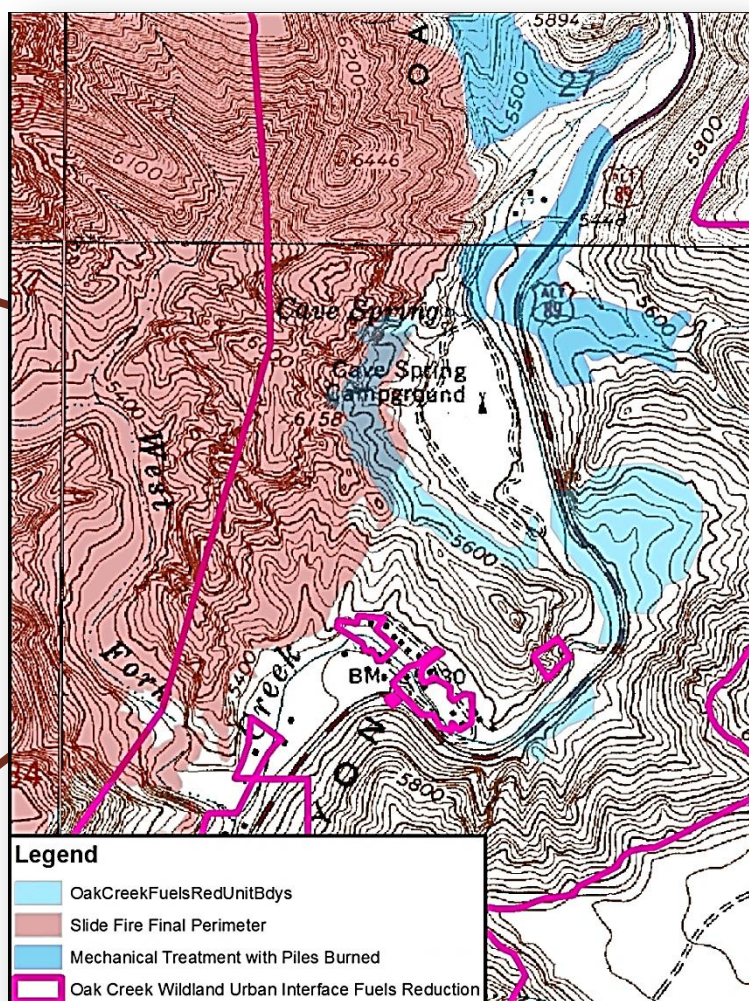
The Cave Springs block of the Oak Creek Fuels Reduction Project is located south and west of the Cave Springs Campground. The treatment block had been mechanically cut in 2009 and the piles were subsequently burned in 2010.



Figure 9: Photo showing utilization of an existing control line within treatment block.



Figure 10: Photo showing treatment effective in reducing vegetation mortality.



The Cave Springs block is located immediately adjacent to the Cave Springs Campground. The campground is operated through a concessionaire contract that is dependent on recreation for income. “If the Forest Service had not treated the slopes around the campground, we would have lost all of the trees and would have lessened the number of visitors to the campground” (RRM Concessionaire). Looking at both figures 9 & 10, the burnout operation implemented within this treatment block closely resembles post-broadcast prescribed fire effects. Nearly all overstory vegetation was retained and some of the large downed woody debris was also retained, giving wildlife in the area habitat opportunity that may have been lost during the fire. Figure 9 shows the utilization of pre-existing line as a holding feature for burnout operations, pushing the main fire upslope and away from the campground.

Pine Flat Block



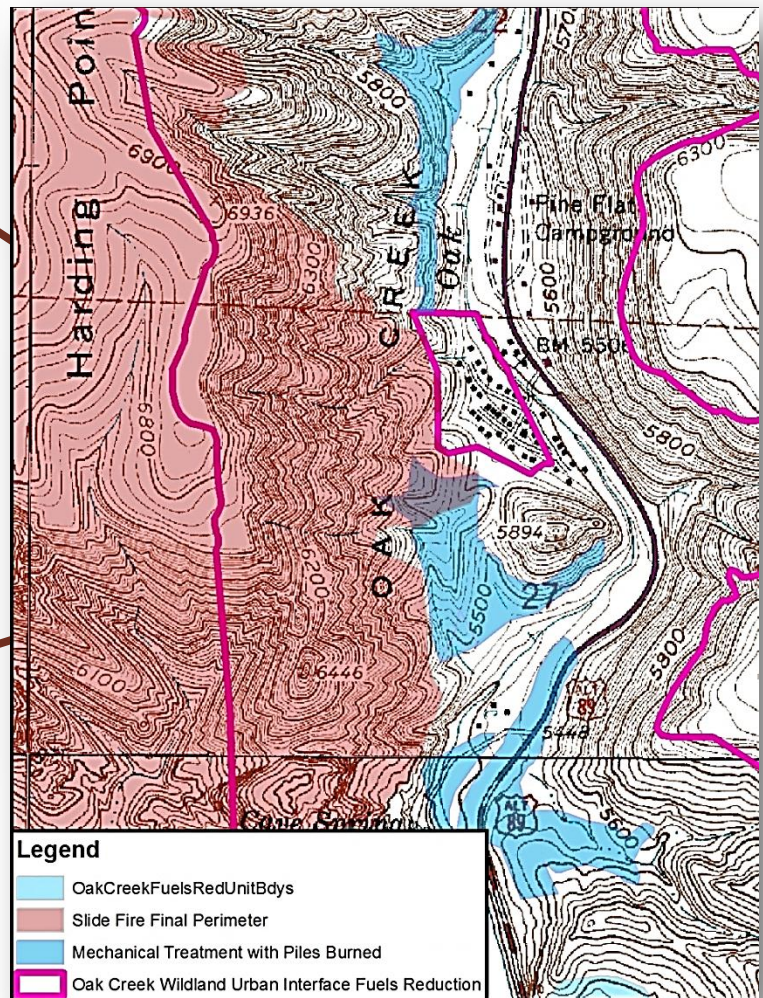
Figure 11: Photo of pre-existing line utilization.



Figure 12: Photo showing treatment effective in reducing vegetation mortality.

The Pine Flat block of the Oak Creek Canyon Fuels Reduction Treatment is the farthest north treatment block affected in Oak Creek Canyon. According to Travis Mabery, this treatment experience significant creep while burning the vegetation piles in (2010?), resulting in a more broadcast fire effect across the treatment. Looking at figure 12, one can see that the mechanical treatment followed by prescribed type fire was extremely effective in reducing overstory mortality. In addition the area also retained understory vegetation in some locations. This treatment was likely critical to protecting the community of Pine Flat, where there are many homes with limited defensible space (Figure X). Like many of the treatment blocks mentioned earlier, the presence of existing control lines allowed for the expedition of burnout operations which helped keep fire fighters ahead of the primary fire front.

The Pine Flat block of the Oak Creek Fuels Reduction Project is located south of the Pine Flat Subdivision. The treatment block had been mechanically cut in 2009 and the piles were subsequently burned in 2010.



Woody Ridge Forest Restoration Project

The Woody Ridge Forest Restoration Project was established to directly reduce the risk of active crown fire movement towards the communities of Flagstaff. The goal of the project is to create conditions that would force wildfire to drop out of the overstory canopy and behave under low intensity surface fire. Additionally, the Woody Ridge Forest Restoration Project utilizes clumpy/groupy canopy patterns with canopy interspaces that promote vegetative biodiversity and mimics natural disturbance across the landscape. Figure 11 shows the mechanical manipulation prescription that emphasizes the clumpy/groupy pattern.



Figure 13: Photo showing clumpy groupy pattern created through the mechanical manipulation of overstory vegetation.



Figure 14: Photo showing treated versus untreated stands. Definitive delineation of reduced potential for active crown fire post-treatment.

Day two of the Slide Fire (5/21) resources on the fire made a conscious decision to utilize forest road 535 as a northern control line and began burnout operations utilizing the Tea Cup timber sale of the Woody Mountain Forest Restoration Project (mechanically harvested in 2012 and piles burned in 2013) as a control feature because of the ability to moderate fire behavior and keep fire out of the overstory canopy. In addition, on day three (5/22) the fire developed slope and wind alignment and through approximately 300-500 spots over the 535 rd. Rick Miller (FMO of Flagstaff District and type 1 Ops on the IMT) said that they were able to pick up all the spot fires that day specifically because the treatment limited fire spread.



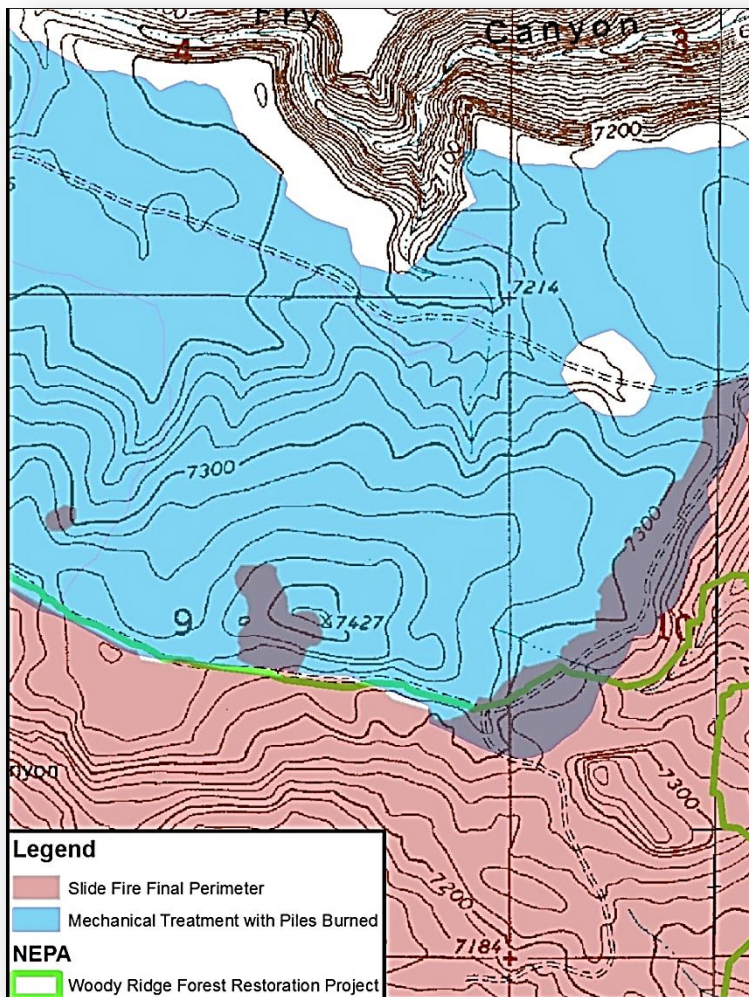
Figure 15: Photo of a pile that was burned during the woody project. Residual heavy fuel caught an ember from the spot fires on day 3



Figure 16: Photo showing limited fire spread in the largest spot fire on day 3 (~4 acres).



Figure 17: Aerial photo of spot fire.



Kachina Village Forest Health Project

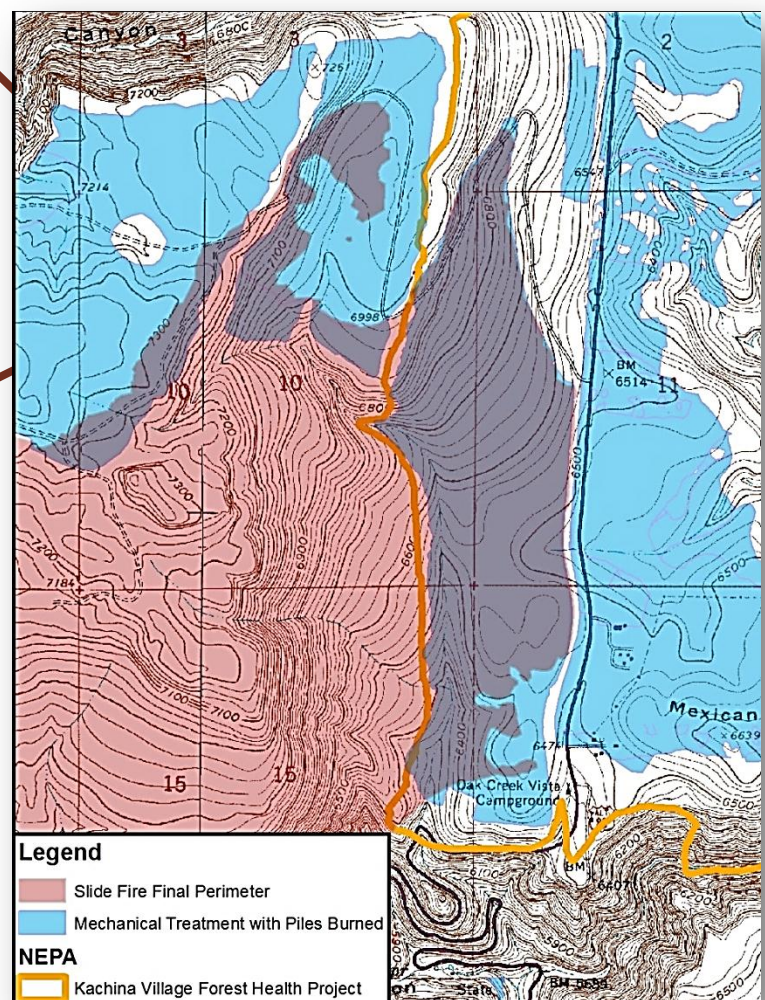
The Kachina Village Forest Health project was developed to “Manage forest fuels and fire risk to reduce potential for a large, stand replacing fire in the Wildland-Urban Interface and to create forest conditions from which a crown fire would unlikely originate under moderate fire weather” (Kachina EA). The project combined mechanical harvesting and broadcast prescribed fire to achieve the goals identified in the EA. The slide fire only affected the far southern portion of the project and was the initial anchor point for the burnout on day 2. Because this area had been mechanically treated previously (2006) and the slash piles had been burned (2010). Firefighters were able to use the area to initiate a burnout ahead of the main fire front. In addition, the treated area extended to the north east which may have reduced the potential for spot fires over 89A which would have put the communities of Forest Highlands and Village of Kachina at risk.



Figure 18: Photo showing fire effects during burnout operations. Fuel consumption is similar to broadcast prescribed fire effects.



Figure 19: Photo showing limited fire effects largely due to the lack of horizontal continuity or contiguous fuels.



Historic Timber Sale Influence

There are multiple past timber sales that fall within the perimeter of the Slide Fire. These timber sales occurred from 1985 through 1998 and were implemented with a primary objective of timber product sale rather than hazardous fuels reduction. That being said, these past timber sales may have still influenced fire behavior and intensity. Due to limited available information and the lack of accurate spatial accounting, these treatments will not be covered in the same level of detail as the treatments assessed above. Past reporting methods for treatments did not require spatial representation of the actual area treated. Instead, if any portion of a stand was treated, the whole stand was able to be reported and claimed as an accomplishment.

Harding Point 10K Timber Sale

The Harding Point 10K Timber sale incorporated 3 separate product sales. Based on information available, sales included pulpwood, shelterwood and a combined product TSI precommercial thin that was harvested between 1989 and 1994. Because of limited information it is not known if these areas were subsequently burned; however, the biomass piles were likely burned one year post harvest. Effects of mechanical treatments tend to trail off as the treated area ages, depending on initial treatment intensity. The areas where shelterwood treatment were implemented show less overstory mortality than those that were multi product or TSI precommercial thinning

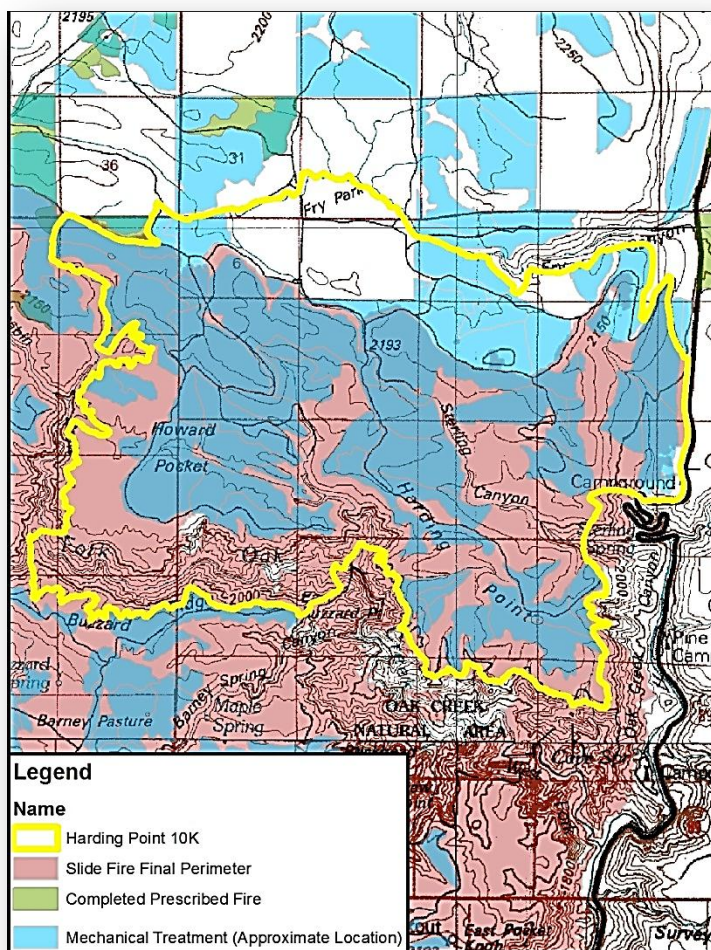


Figure 20: Photo of stand where a pulpwood/shelterwood harvest likely occurred in 1992. Some canopy scorch, but limited mortality.



Figure 21: Photo of stand where a TSI precommercial thin likely occurred in 1994. More canopy mortality present because less overstory was removed during harvest.

Big Draw/Crater Sinks 10K Timber Sale

The Big Draw/Crater Sinks Timber sales differ from the Harding Point timber sales in that many of stands had broadcast prescribed fire implemented 1-10 years after the mechanical harvest. The product based sales again include TSI precommercial thinning, as well as, pulpwood type sales that were harvested from 1990 to 1994. Roughly one third of these sales were followed by pile burning and broadcast prescribed fire in 1994-2004. These older harvest blocks were used in similar fashion as the Harding Point blocks to moderate fire intensity coming out of the West Fork of the Red Rock Secret Mountain Wilderness and limit the potential for spot fires over forest road 535. The overall effectiveness of these blocks was dependent upon whether or not broadcast fire was used post-harvest or not. Figure 20 shows higher crown scorch when a mechanical harvest was not coupled with broadcasted prescribed fire, whereas, figure 21 shows the effects of the mechanical harvest with a broadcast prescribed fire in 2004.

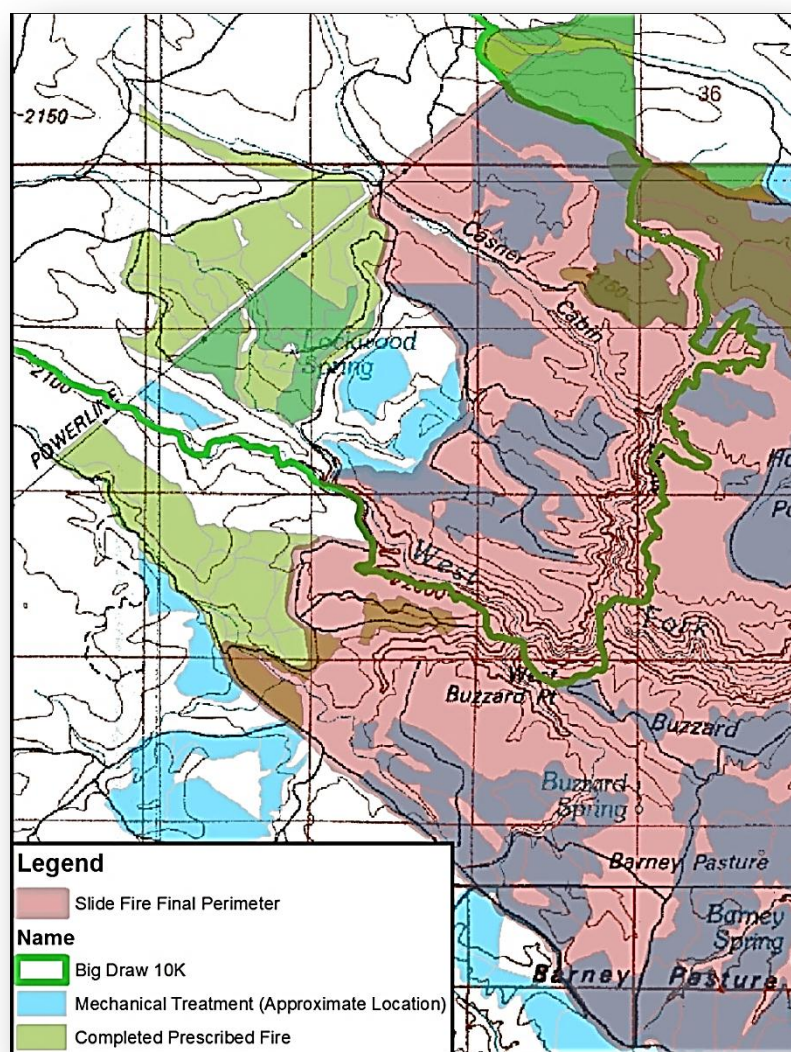


Figure 23: Photo of a stand where a precommercial thin was couple with broadcast prescribed fire. Overstory scorch was less due to less surface fuels after prescribed fire.

Buzzard/Barney Pasture 10K Timber Sale

The Buzzard and Barney Pasture Timber Sales differ from the Harding Point and Big Draw/Crater Sinks Timber Sales in the fact that the Buzzard Timber Sale had areas that were harvested as seed tree harvests (Figure X). The entire sale is composed of precommercial TSI, commercial timber sale and seed tree harvests that were mechanically manipulated in 1990-1992. Subsequently, in 1995-1997 all biomass piles were burned, removing much of the downed woody debris component that is prevalent within the Slide fire perimeter where treatments have not been implemented.

The timber sale blocks that were harvested as seed tree cuts lowered fire behavior the most significantly (foreground of Figure X). The other blocks that were harvested as commercial or precommercial TSI sales experienced more active fire behavior (Back ground of Figure X) and subsequently resulted in slightly higher overstory mortality. Figure X shows an active burnout of two blocks within the Buzzard Timber Sale. Fire behavior is more active in the area that was precommercial thinned than the seed tree cut.

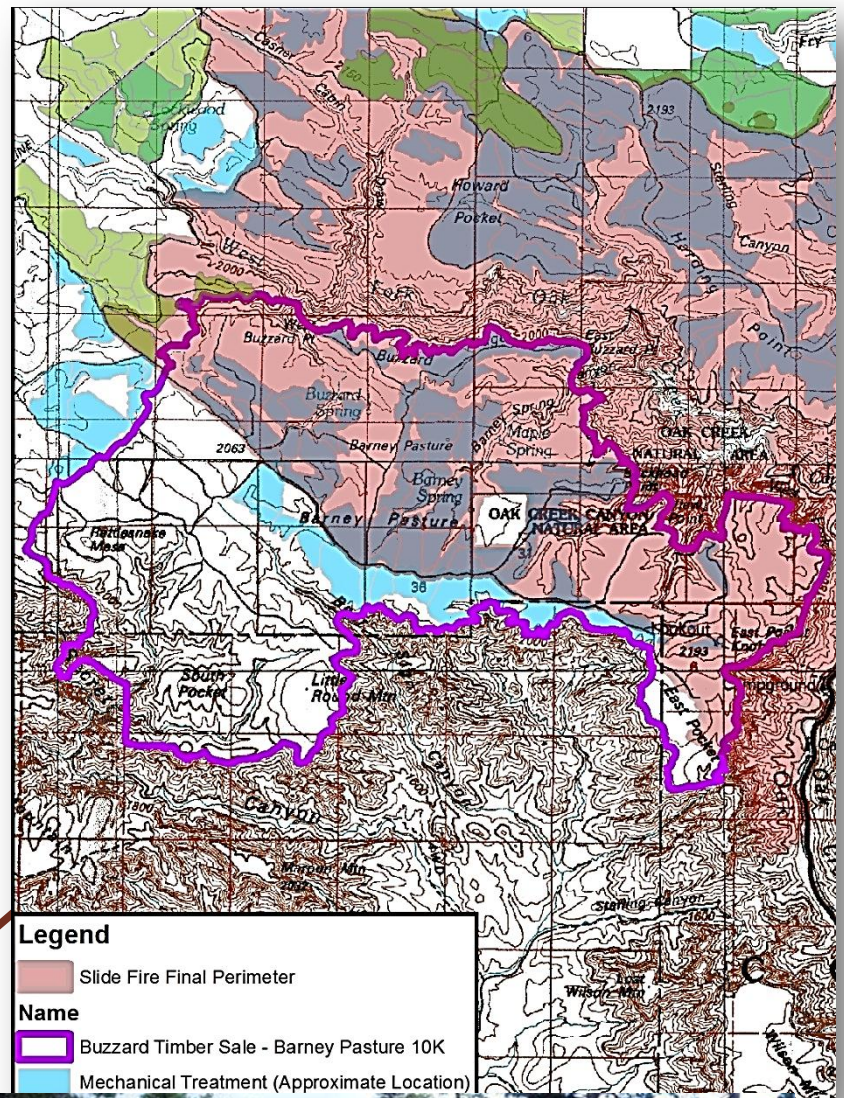
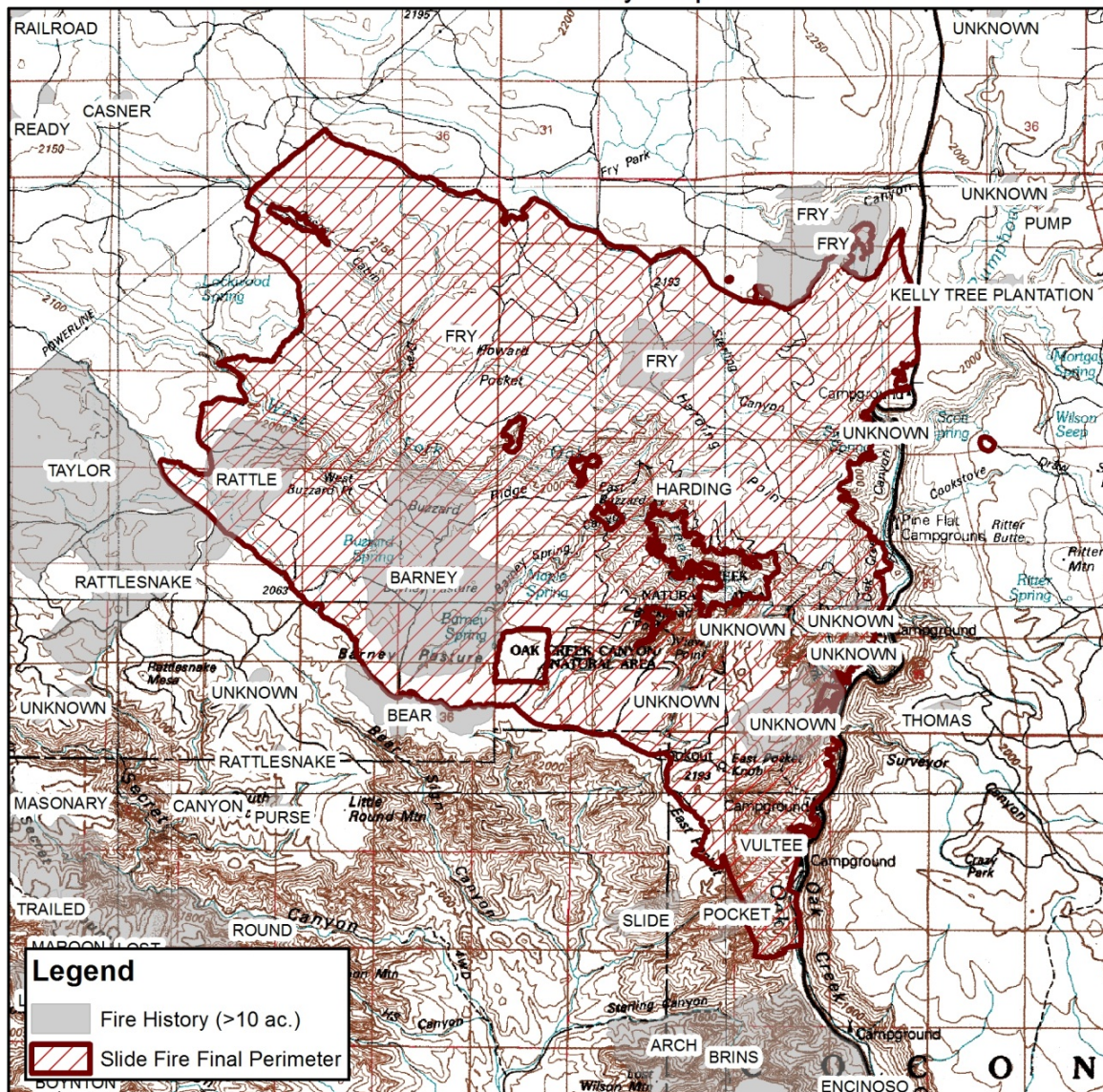


Figure 24: Photo of Buzzard Timber Sale. The foreground is a seed tree harvest in 1992 and the background is a precommercial sale also implemented in 1992. Fire behavior is more active in the denser precommercial thin block than the more open seed tree cut.

Past Wildfire Influence:

There were multiple interactions between past wildfires and the Slide fire. Based on the Coconino N.F. current large fire database, approximately 3,105 acres or 15% of the total area burned in the Slide fire has seen past wildfire from 1930 to present. These fires varied in intensity and the continued effect on the general landscape is also varied. This report will briefly discuss 3 of the 17 past wildfires larger than 10 acres that had the largest influence on fire behavior and occurred within the Slide fire perimeter. Several fires have burned directly adjacent to the Slide fire and may have influenced the overall fire behavior in terms of reducing spotting potential over the control line; however, because they did not directly influence the burned area they will be excluded.

Slide Fire History Map



Rattle Fire 1972

The Rattle fire was a human caused ignition in early May of 1972. The fire appears to have burned with moderate to high fire intensity. Much of the perimeter still shows visible signs of being a burn scar. The fire removed small to moderate sized pockets of overstory vegetation which has scattered regeneration through it. The Slide fire burned through the Rattle fire scar during a burnout operation on days 7 and 8. During these days, the low that was producing higher humidity and lower temperatures had moved off to the east and was replaced by another high pressure system. During this time, overall fire behavior on the Slide fire began to subsequently increase; however, throughout the majority of the Rattle burn scar, fire intensities remained low to moderate.

Barney Fire 1946

The Barney fire was an unknown cause ignition in 1946 (exact date is not known). This fire burned approximately 1,514 acres that was subsequently replanted with 300 – 500 trees per acre (judging by the even aged and even spaced cohorts of young ponderosa pine). The Barney fire seems to have removed much of the downed woody debris within the scar which resulted in canopy scorch, but limited canopy consumption. However, where the planted cohorts meet up with the toe slope of buzzard ridge, the even aged (low canopy base height) stand led to high fire intensity on the slope than may have occurred if the trees hadn't been planted.

Fry Fire 1973

The Fry fire was an unknown cause ignition in 1973 (exact date is not known). This fire burned approximately 307 acres. Judging by the remnants of the fire scar, all but the middle of the fire burned under more moderate to low severity. The picture on the right was taken in the middle of the burn scar. The fire larger trees within openings remain green, whereas, adjacent stands suffered more canopy scorch. The Fry burn scar re-burned on day 3 of the Slide fire (same day spotting occurred over the 535rd, during an active push to the north. Considering that the old scar experience fairly active fire behavior, the more open locations burned fairly low severity compared to the adjacent stands.



Figure 25: Photo of 1972 Rattle Fire.



Figure 26: Photo of 1946 Barney Fire.



Figure 27: Photo of 1973 Fry Fire.

Potential Consequences:

The potential consequences that could have resulted from the further or total loss of values on the Slide fire are highly significant. Oak Creek Canyon is the second most recreated location in Arizona after the Grand Canyon. In addition, there are several hundred residents that call the Oak Creek Canyon home. Many of these homes are nestled directly adjacent to Forest Service land, and consumed by vegetation with little to no defensible space (Figure 28).



Figure 28: Photos of structures and WUI in Oak Creek Canyon.

In addition, there is a high level of vegetative biodiversity and wildlife habitat in the canyon. From the narrow-headed gatersnake in the mouth of the West Fork of the Secret Mountain Wilderness to the Mexican Spotted Owl on northern aspects on the slopes of the entire fire, the potential loss of habitat was significant. Some habitat was lost as a result of the Slide fire; however, fuel treatments helped mitigate the effects in some habitat, as well as, helped mitigate loss of adjacent habitat had the fire burned on its own terms. Vegetation effects were varied; however, only a small portion of the fire burned significantly outside of the primary vegetation fire regime (Table 2). Also, there is great cultural significance in the immediate area of the Slide fire. Oak Creek Canyon itself is a cultural landmark. Consequences that would have resulted if the fire had burned under higher severity over a larger portion of the canyon could have impacted more cultural sites and the significance of the canyon itself.

Furthermore, if immediate suppression action had not taken place and fuel treatments had not been strategically placed in locations to protect significant values, the potential loss of these values could have been further elevated. Figure 29 shows an FSPRO modeling run through WFDSS that shows 70% likelihood that fire would have reached Flagstaff had immediate action not taken place. This would cause even more severe effects on critical municipal watersheds and infrastructure, as well as, significantly impact the communities around and within Flagstaff economically.

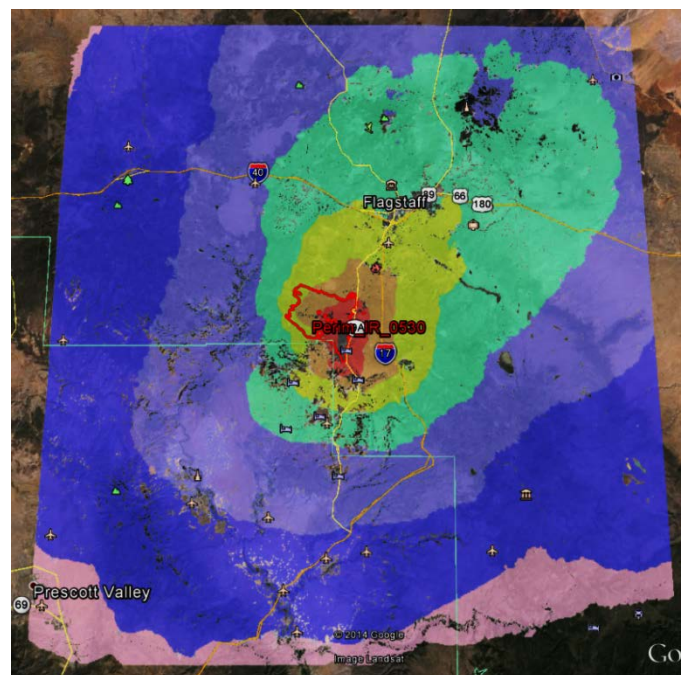


Figure 29: FSPRO modeling output from WFDSS showing the probability of fire reaching Flagstaff without suppression actions.

Slide Fire Soil Burn Severity (BARC)

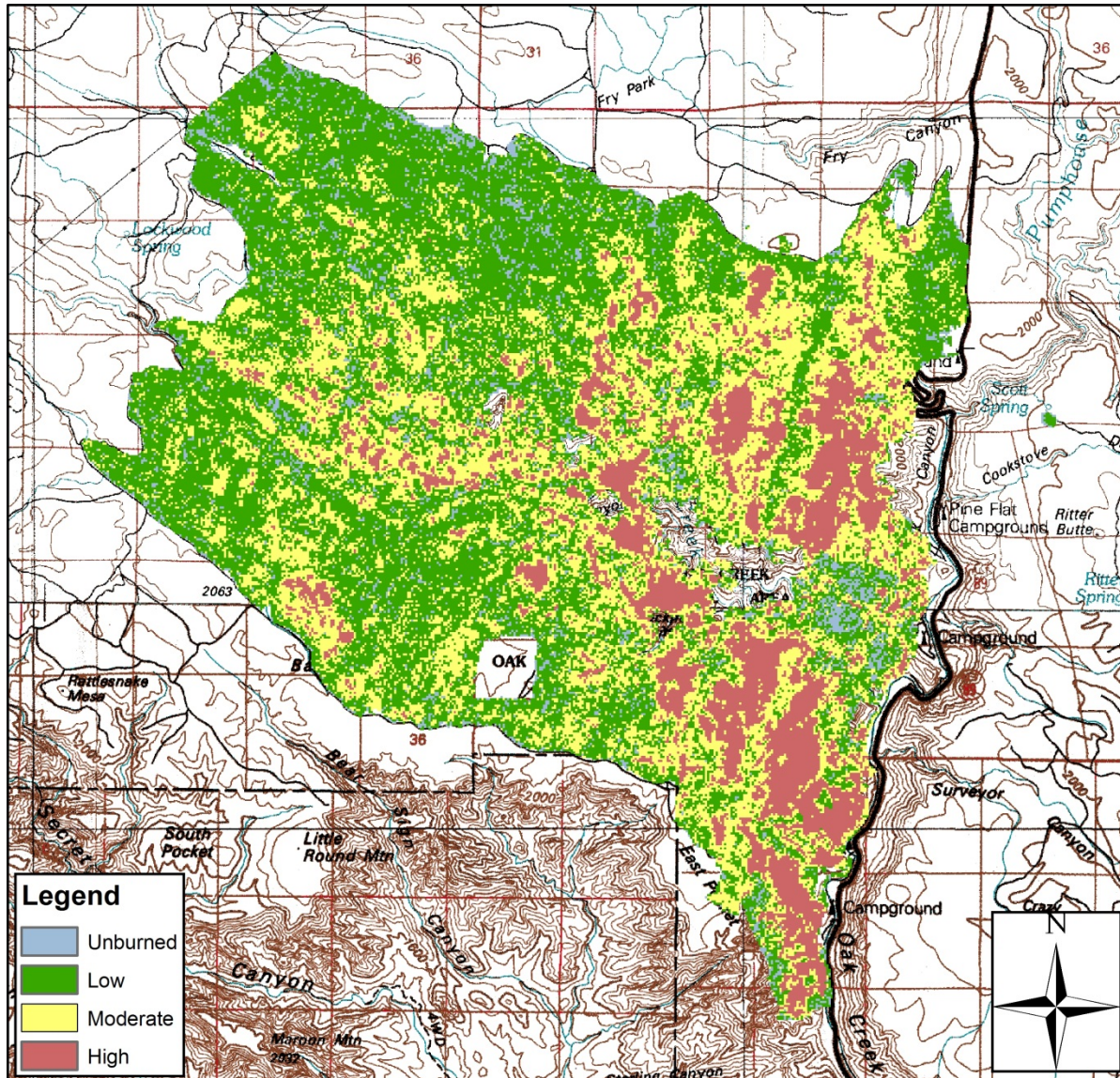


Table 1: Comparison of DRAFT preliminary BARC (Burned Area Reflectance Classification) results for the Slide Fire. Burned area soil severity drops off significantly when mechanical treatments are followed by broadcast prescribed fire. (This is likely due to the removal of DWD during the prescribed fire) Less Fuel = Less residence time = Less negative soil effects.

Soil Burn Severity Classification BARC	Slide Fire	Mechanically Treated	Mechanically Treated and Burned
UNBURNED	5%	6%	11%
LOW	47%	58%	79%
MODERATE	34%	29%	10%
HIGH	15%	7%	0%

Slide Fire Vegetation Severity (RAVG %BA Loss)

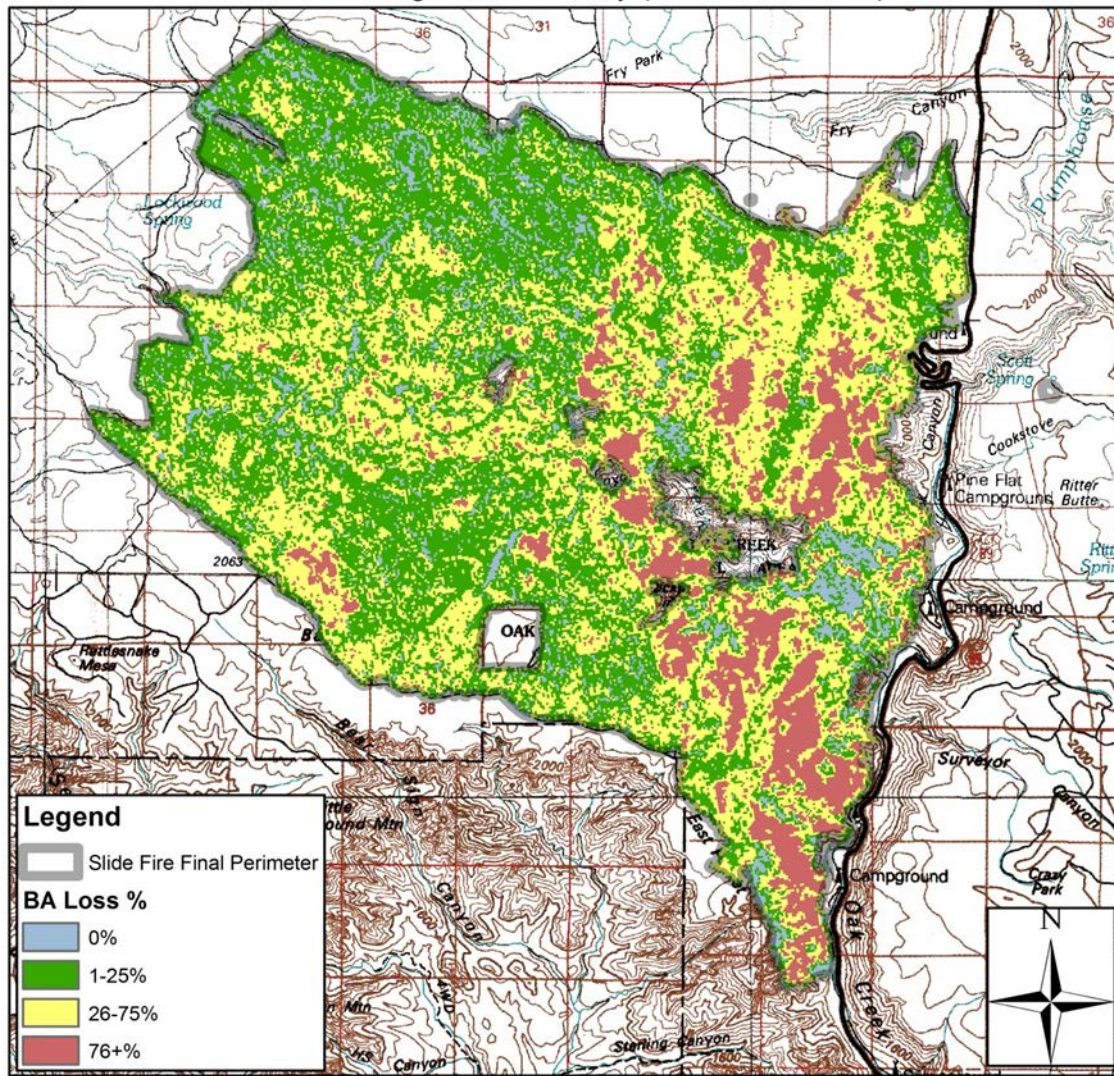


Table 2 Comparison of preliminary RAVG (Rapid Assessment of Vegetation Condition) results for the Slide Fire by PNVT (Potential Natural Vegetation Type). In the ponderosa pine PNVT only 6% burned under high severity after mechanical treatment and only 1% if the area was mechanically treated and broadcast prescribed burned.

Vegetation Severity Classification RAVG by Major PNVT		%BA loss	Slide Fire	%BA Loss Areas Mechanically Treated	%BA Loss Areas Mechanically Treated and Burned
Ponderosa Pine (Fire Regime I)	(VERY LOW)	0%	7%	7%	15%
	(LOW)	1-25%	46%	51%	69%
	(MODERATE)	26-75%	38%	36%	14%
	(HIGH)	76+%	8%	6%	1%
Interior Chaparral (Fire Regime II, IV)	(VERY LOW)	0%	13%	3%	0%
	(LOW)	1-25%	25%	32%	0%
	(MODERATE)	26-75%	34%	34%	0%
	(HIGH)	76+%	16%	32%	0%
Mixed Conifer with frequent fire (Fire Regime I, III)	(VERY LOW)	0%	28%	8%	14%
	(LOW)	1-25%	44%	56%	77%
	(MODERATE)	26-75%	27%	27%	9%
	(HIGH)	76+%	23%	9%	0%

Successes/Lessons Learned:

- 1) Even relatively small treatments can have significant effect on reducing fire behavior, allow for more evacuation time, reduce spot fire potential and protect values. (Oak Creek)
- 2) Pre-existence of control line can expedite burnout operations around help protect values/structures. (Oak Creek)
- 3) Hazardous fuel and restoration treatments can help provide safe anchor points for burnout operations in addition to reducing fire intensity near the control line (Woody/Kachina)
- 4) Hazardous fuel and Restoration treatments can significantly reduce the potential for spot fires to become established. (Woody)
- 5) Older (20 year or less) timber sales can reduce fire intensity as a result of lower stand density; however, effectiveness is more dependent on intensity of initial prescription. (e.g. more density removed, the longer the treatment is effective). (Harding, Big Draw/Crater Sinks, Buzzard/Barney).
- 6) When treatments are coupled with broadcast prescribed fire, 1) vegetation effects are further reduced under a wildfire scenario, 2) Soil severity drastically improves as a result of reduced surface fuel and less residence time. (Big Draw/Crater Sinks)
- 7) Past Wildfires can also provide an area where fire behavior will be moderated. Giving firefighters more opportunity for direct attack or a safer location to implement backfiring or burnout operations (Rattle Fire).