Assessment of the Effects of Multiple Fuel Treatments on Fire Spread and Timber Stand Damage
Stream Fire, Plumas N.F.
July 26, 2001

Sid Beckman
Fire Behavior Analyst, California CIIMT 5

Fire Behavior Summary:

The area involved in the Stream Fire covered a range of vegetation types and fuel models. These consisted of:

1. Jeffery Pine with sage and bitter brush…. IFFL Fuel Model 2
2. Jeffery Pine with needle cast….IFFL Fuel Model 9
3. Mixed Conifer with manzanita…. IFFL Fuel Model 10

The fire ranged in elevation from 4400 feet at the confluence of Cold Stream and Indian Creek to 5810 feet along the northwestern edge. Slopes ranged from 10 to 55% with the steepest areas in the lower reaches of Cold Stream Creek.

For the winter of 2000-2001, Quincy received 40% of normal precipitation and Laufman 38% of normal. The energy release component (ERC) for the Eastside of the Plumas National Forest was 104 with the 1000-hour fuel moisture value at 7%. Calculated live fuel moisture in manzanita was 90%. The long term Palmer Drought Severity Index was Extreme.

The average forward rate of spread for the period from 13:00 to 18:00 was 24 chains/hour on July the 26th. The distance traveled was 1.5 miles. Fire spread was predominately associated with medium to long range spotting. Observed spotting distances ranged from 2000 feet to 4000 feet. These spots when established burned back into the main fire while forward spread lofted embers, which created additional spot fires. Intense surface fire, large-scale torching, dependent and independent crown runs were also mechanisms of fire spread.

Spot Fire #1, no recent fuels treatment
Lat. 40.11.970 Long. 120.35.958 T27N, R12E, NW of the SE of Section 14.
South aspect, 18% slope, Ridgetop location, 3000 feet downwind from main fires edge.
Jeffery Pine with 60% cover of manzanita and bitter brush.
Mixed Fuel Model 2 & 9
Comments: 15 to 20 foot bole scorch, 80 to 90% crown scorch of reproduction. Damage to stand associated with fire in large down logs. Probable cause of spot was ember generation from crown run on the south side of Antelope Lake. Area is littered with firebrands. Brush crowns on the interior of spot are 100% consumed.

Spot Fire #2, Hallett Underburn
Lat. 40.11.974 Long. 120.36.553 T27N, R12E, SE of the NE of Section 15.
Southwest aspect, 23% slope, base of slope, 1600 feet from large spot along Road 27N41, 4600 feet from the main fire on the south side of Antelope Lake.
Jeffery Pine with 20% cover of manzanita and bitterbrush, small concentrations of slash and brush skeletons.
Fuel Model 9
Comments: 2 to 3 foot bole scorch, 10 to 20% crown scorch. Discontinuous fuel creates unburned islands of fuel within the interior of spot. Low intensity resulted in minimal stand damage.

Spot Fire #3, North Antelope Timber Sale DFPZ, thin from below with biomass removal.
Lat. 40.12.141 Long. 120.37.165 T27N, R12E, NW of the SW of Section 15
Flat ground
Jeffery Pine with 5% cover of bitterbrush and mules ear
Fuel Model 9
Comments: 12 to 18 inch bole scorch, no crown scorch. Uncertain of ignition origin. Low intensity surface fire allowed for direct attack and quick containment. Minimal damage to the stand occurred as a result of low intensity fire.

Point #4, North Antelope Timber Sale, thin from below with biomass removal.
Lat. 40.119.51 Long. 120.37.430, T27N, R12E, NW of the SW of Section 15
North-Northeast aspect, 15% slope, base of slope
Jeffery Pine
Fuel Model 9
Comments: 6 to 12 foot bole scorch, 30% crown scorch, moderate intensity surface fire in this area, 100% of surface fuel and duff consumed. Large patch of high intensity burn to the northwest.

Point #5, Hand thin and pile burn.
Lat. 40.11.482 Long. 120.37.161 T27N, R12E, NW of the NW of Section 22
North-Northwest aspect, 37% of slope, base of slope.
True Fir
Fuel Model 10
Comments: 100% bole and crown scorch, area is surrounded by high intensity crown fire.

Conclusions: The predominate mechanism of fire spread on the Stream fire was moderate to long range spotting. This was perpetuated by the receptive fuelbed comprised of large woody debris with low fuel moistures. Multistoried timber stands also provided adequate ladder fuels that led to large scale torching and eventually dependant and independent crown fire. Strong afternoon slope and canyon winds also influenced fire spread.

Weather factors (temperature, relative humidity, wind) were not out of the ordinary for this area, at this time of the year.

Antelope Lake provided a highly effective man-made barrier that aided in stopping fire spread.

Spot fires within the Hallett Underburn and the N. Antelope Timber Sale DFPZ had considerably less damage to the surrounding stand than the spot fire in the untreated area. This was a result of low intensity fire and smaller amounts of large fuels present on the site. Large down logs on Spot #1 acted as receptors for fire brands and generated the heat needed to scorch surrounding reproduction and overstory. Spot #3 was readily accessible to personnel and low intensity fire allowed for direct attack.

Where the main fire entered the treated Jeffery Pine stand (Point #4, N. Antelope T.S.) surface intensity decreased and as a result crown scorch diminished. Areas of treated Jeffery Pine to the east, above and below Road 2N803 were severely damaged due to the intensity of the main fire as it entered the stand.

In the White Fir stand (hand pile & thin) damage was a result of high intensity crown fire entering the area. Surface fuel treatments did not have any effect on reducing fire spread or stand damage.

Landscape level fuel treatments in fire excluded stands that reduced surface and ladder fuels would result in decreased damage and increased suppression capability. The effects of wildfire in treated fuelbeds would likely mirror what occurred in Spot #2 (Hallett Underburn) and Spot #3 (N. Antelope DFPZ) and Point #4 (N. Antelope DFPZ). Damage to treated stands within the fire was a result of high intensity crown and surface fire entering them from adjacent untreated stands.

Defensible Fuel Profile Zones provided adequate points to stop low to moderate intensity fire. These structures were inadequate to stop high intensity crown and surface fires that burned into them from adjacent untreated stands. Firebrand production in combination with strong afternoon terrain winds caused mid to long range spotting that exceeded the width of DFPZ’s.