

SADLER COMPLEX FIRE BEHAVIOR SUMMARY

AUGUST 5-11, 1999

Two fire behavior analysts, Rod Dykehouse and Rich McCrea, and a fire behavior analyst trainee, Chuck Mark provided the fire behavior support for this fire. Risk assessment for decision-making was supported by short-term fire behavior predictions (1-3 days). Such information was provided to respond to fire threats to private land and structures, oil well facilities, ground forces, air support, and to aid in development of strategies and tactics to meet objectives for managing this fire.

Discussion

The Horse, Pine, Table Mountain, and Sadler fires were started by lightning on August 5, 1999 by dry thunderstorms.

Weather

Extremely dry conditions prevailed, when these fires started on August 5, 1999. After a wet spring, minimal precipitation had been received in northern Nevada for two months. Weather that most affected these fires consisted of low relative humidities from 8 to 20% and high winds anywhere from 15 to 40 mph. These weather factors combined with dry fuels, complex topography and very unstable atmosphere, (Haines indices 5-6) led to extreme fire behavior conditions that included high rates of spread, high fire intensities, fire whirls, and localized downslope fire runs.

Fuels

These fires were burning in predominately two types of fuels consisting of sagebrush grasslands and pinyon/juniper woodlands. Measured fuel moistures received on August 2, 1999 for sagebrush ranged from a low of 59% to a high of 125% with the range concentrated in 59-95%. The 1000 hour fuels were measured at 5-6%, while the conifers (Pinyon pine) were measured at 124-125%. One hour dead fuel moistures ranged from 3% to 6%. These fuel moistures indicate very dry live fuels and dead fine fuels. Fire behavior fuel models 2, 5, and 6 were used to predict rates of spread and fire intensities.

Topography

The fire area is dominated by isolated mountain ranges that trend north and south with intervening narrow valleys. The mountain ranges rise approximately 2000-2500 feet above the valley floor. Valley floor elevations are just over 5000 feet, while higher elevations in the mountains range from 7000 to 9200 feet. The foothills are rolling, but the main ridges are dissected with steep slopes ranging from 30-70%.

Fire Behavior Chronology

The following table illustrates the fire progression. A fire progression map is included in the appendix to this document.

SADLER AND TABLE MOUNTAIN FIRES

DATE	8/6/99	8/7/99	8/8/99	8/9/99	8/10/99	8/11/99
SIZE/ ACRES	12,400	99,800	150,000	183,205	183,705	183,705
DAILY GROWTH	12,400	87,400	50,200	33,205	500	0

PINE AND HORSE FIRES

DATE	8/6/99	8/7/99	8/8/99	8/9/99	8/10/99	8/11/99
SIZE/ ACRES	8,000	16,880	25,780	25,795	25,795	25,795
DAILY GROWTH	8,000	8,880	8,900	15	0	0

August 6, 1999

Fire behavior analyst, Rod Dykehouse, arrived on the fire at 1600 hours. Fire behavior on the Horse and Pine fires exhibited high rates of spread up to 150 chains/hour. Weather observations were as follows:

TIME	DRY BULB TEMP	RELATIVE HUMIDITY	WIND SPEED	WIND DIRECTION	COMMENTS
1,600 hours	80	21%	20 mph	SW	Wind gusts to 27 mph, 70% cloud cover.
1,700 hours	83	17%	18 mph	SW	Wind gusts to 20+ mph, 90% cloud cover.
1800 hours	81	15%	9 mph	SW	90% cloud cover.

Fires were burning in sagebrush/grass. The brush canopy was about 2 feet above ground level with about 60-80% canopy cover. Short-range spotting was also occurring. At approximately 1800 hours the wind began to subside. At 1900 hours the winds shifted from southwest to west and northwest. Fire spread moved to the east, but the fire was laying down due to reduced windspeeds.

August 7, 1999

Weather forecast predicted lower windspeeds from the southwest, more stable air (Haines index 4) and cooler temperatures. Another cold front was approaching the area around 1700, which would cause the winds to shift from the southwest to the northwest with the frontal passage as on August 6.

Fire behavior was not as active as the previous day. Fire rate of spread was approximately 60-100 chains/hour with 16 foot flame lengths on the Horse and Pine fires. Most of this spread occurred on the southeast edge of the Pine fire, and the southeast and northwest perimeters of the Horse fire. The Sadler fire was more active on its northeast and southeast perimeters. Rates of spread on the Sadler fire were estimated at 100 chains/hour with 18 foot flame lengths. Sadler fire gained significant acreage to the northeast and southeast. Cold front arrived around 1800 with a wind shift to the northwest, lower windspeeds and much reduced fire behavior. The Table Mountain fire had run into the Sadler fire to the northeast by the end of the day.

August 8, 1999

Weather forecast predicted stronger south/southwest winds with gusts to 30 mph, single-digit relative humidities, and a Haines index of 5. Smoke columns were forming at 0730 with fire activity increasing as inversion broke around 1000-1100. Relative humidities dropped to 8% by 1400. A portable RAWS was set up on the west side of the Sadler fire. Winds varied from southeast to southwest as measured by the RAWS. Sadler fire made a significant run, 5-6 miles, north in the afternoon and early evening. Winds subsided around 1930 to 7-9 mph at the RAWS site. Fire stayed active well past midnight. RAWS at midnight measured temperature 68 degrees, relative humidity 10%, 10 hour fuel moisture 4.7%, and winds at 4 mph. Weather observation at ICP was temperature 53 degrees, relative humidity 32%, and calm winds.

August 9, 1999

RAWS at 0530, temperature 55 degrees, relative humidity 17%, and calm winds. Small smoke column south of ICP indicated the fire burned throughout the night. Inversion set in at 0630, which reduced fire spread and intensity. National Weather Service at Elko, Nevada issued a "Red Flag" warning for the Sadler fire due to low relative humidities, high winds, and a Haines index of 6. Rich McCrea notified Communications to get this updated weather information to operations personnel out on the fire.

Inversion lifted between 0900-1100 hours with the fire picking up in spread and intensity. Three to four smoke plumes were clearly visible in Divisions L and M. Crews were anchoring into black and burning out behind dozers in Divisions L and M.

From 1300 to 1600 proceeded to northeast corner of fire to observe fire spread to the north where burnout had escaped. Fire was running parallel to Dixie Creek on the east side of the valley. It was running in sagebrush/grass fuels at 120-140 chains/hour with flame lengths from 10-20 feet. Fire ran 3 miles in about 2 hours.

From 1630 to 1900 fire blew out on west side of Pinon Range past Trout Creek into Lee Canyon. This blowup gained approximately 7000-8000 acres. This fire run was plume-dominated as predicted higher winds never really surfaced.

Fifteen acre slopover occurred on the Pine/Horse fire, which was picked up by ground forces.

August 10, 1999

No inversion present at 0500. Sadler fire was actively burning between Trout Creek and Lee Canyon. From 0530 to 0630 outflows from thundershowers reduced visibility significantly and winds increased to 15-20 mph with gusts to 35 mph. Fire ran to Mill Creek, pushed by the winds. Humidities rose from 18% to 35% and started to receive light sprinkles in and around camp. Ash and smoke was blowing throughout the area.

From 0800-0930 slopover blew out of Trout Creek east of ICP. The fire burned rapidly in sagebrush/grass fuels with rate of spread up to 1 mph and flame lengths 10-25 feet. Higher humidities and lack of fine fuels on spur ridges reduced fire spread.

Higher humidities and more cloud cover than predicted reduced any significant fire spread or intensity.

Large thunderstorm cell passed right through ICP and over the north end of the Sadler fire from 1400-1530. High winds as a result of a microburst winds, 40-60 mph, blew over outhouses and tents in fire camp. Tent poles were busted and the cook tent, with chairs, was lifted airborne and blew to the other north side of ICP. Fire activity was minimal after the passage of this wet thunderstorm.

Another strong thunderstorm moved through ICP and the north end of the Sadler fire bringing more rain, wind, and lightning. Windspeeds of around 25-35 mph were experienced at ICP.

Minimal fire activity on the Pine/Horse fire.

Fire Spread Projections

Fire spread was assessed utilizing nomograms and tables derived from the BEHAVE fire behavior prediction system, and calibrating those fire spread and intensity predictions by direct

observation of fire behavior. Fuel models utilized for fire behavior predictions were Fire Behavior Fuel Model 5 for the first three days of the fire, and fuel models 2 and 6 later. Fuel Models 5 and 6 were used to predict fire behavior and run fire projections for pinyon/juniper fuels, while fuel model 2 was used for sagebrush/grassland fuels.

Observed fire rates of spread and intensities, based on flame length, were used to calibrate fire behavior predictions. The following table summarizes observed versus predicted fire rates of spread and fire intensities:

DATE	FUEL MODEL	PREDICTED ROS	OBSERVED ROS	PREDICTED FLAME LENGTH	OBSERVED FLAME LENGTH
8/6/99	5	220 ch/hr	150 ch/hr	18 feet	n/a
8/7/99	5	100-170 ch/hr	60-100 ch/hr	12-16 feet	16 feet
8/8/99	5	220-250 ch/hr	140-160 ch/hr	18-19 feet	n/a
8/9/99	2	156-211 ch/hr	120-140 ch/hr	13-15 feet	10-20 feet
8/10/99	2	156-211 ch/hr	80 ch/hr	13-15 feet	10-25 feet
8/10/99	2	156-211 ch/hr	80-100 ch/hr	13-15 feet	15-25 feet

Short-term projections were accomplished in fuel models 2 and 5. Fire spread and intensity in the pinyon juniper woodlands was not observed to validate predictions using fuel model 6. Comparing predicted fire behavior in fuel model 6 to observed on August 6 through August 8 suggests that fuel model 6 could also reflect the observed fire behavior on the Sadler fire in the pinyon/juniper fuel type.

Prepared by:

Chuck Mark, FBAN (T)
 Rich McCrea FBAN
 8/11/99

FIRE BEHAVIOR PREDICTION

Prediction No. 3

FIRE NAME: Sadler Complex

PREDICTION FOR DAY SHIFT

SHIFT DATE: 8/9/99

TIME/DATE OF ISSUE: 2210 8/8

FIRE BEHAVIOR ANALYST: _____

ROD DYKEHOUSE

FIRE BEHAVIOR

GENERAL:

HUMIDITIES IN SINGLE DIGITS, GUSTING SOUTHERLY WINDS AND A HAINES INDEX OF 6 INDICATING UNSTABLE AIR OVER THE FIRE AREA. THIS WILL CAUSE MORE EXTREME FIRE BEHAVIOR TODAY. HIGHER RATES OF SPREADS CAN BE EXPECTED TODAY ESPECIALLY WHERE THERE IS A HIGHER FUEL LOADING OF FINE FUELS. FINE FUEL MOISTURES COULD BE DOWN TO 3% TODAY AS THE TEMPS WILL BE UP 5-10° TODAY WITH RH'S DOWN TO 6%. WE CAN EXPECT FLAME LENGTHS OF 50-100 FEET IN THE PINION/JUNIPER AND UP TO 20 FEET IN THE SAGE/GRASS.

SPECIFIC:

PINE AND HORSE FIRES

FIRES WERE CONTAINED AS OF 2000 ON 8/8. MAIN CONCERN IS THE TRAIL CANYON FIRE THAT BURNED INTO THE SOUTH END OF HORSE FIRE YESTERDAY. SOUTHERLY WINDS COULD PUSH THIS FIRE INTO THE PINE FIRE TODAY. NEED TO BE HEADS UP WHEN ASSIGNED TO THESE FIRES.

SADLER AND TABLE MTN FIRES

EXPECT HOTSPOTS ALONG ALL SECTIONS OF THE FIRE PERIMETER. TORCHING OF JUNIPERS CAN CAUSE SPOTTING ACROSS CONTROL LINES. THIS FIRE EXPERIENCED ACTIVE FIRE BEHAVIOR ALONG MOST OF THE PERIMETER YESTERDAY WITH WINDS SHIFTING FROM THE SOUTHEAST TO SOUTHWEST. FIRE WAS BACKING THROUGH THE PINION/JUNIPER, SAGE/GRASS AGAINST THE WIND ALONG THE SOUTH PERIMETER OF THE SADLER FIRE.

SAFETY CONCERNS

EXTREME WEATHER CONDITIONS EXIST FOR HIGH RATES OF SPREAD TODAY !!!!! REMEMBER L C E S !!!!!!!

FIRES THAT RUN UPHILL FAST IN DRAINAGES , CHIMNEYS, GULCHES AND STEEP SLOPES.

FIRE BEHAVIOR FORECAST NO. 4

FIRE NAME: Sadler Complex **PREDICTION FOR:** Day **OPERATIONAL PD**
DATE/TIME ISSUED: 8/9/99 2130 **OPERATIONAL PD DATE:** 8/10/99

FIRE BEHAVIOR ANALYST: Chuck Mark
Fire Behavior Analyst

WEATHER SUMMARY: High Winds and Isolated Dry Thunderstorms! Tuesday - Partly Cloudy. Maximum Temperatures- 83 to 88 degrees. Minimum Humidities- 12 to 18 percent. Eye-level winds- Slope/Valley 15-25 mph from south with gusts 30-35 mph. Ridgetop winds southerly 25-35 mph with gusts to 35-55 mph. Microburst winds possible from thunderstorm cells. Tuesday night - Widely scattered dry thunderstorms with microburst winds still possible. Scattered showers and wet thunderstorms after dark. Cold front will shift winds to the west/northwest after passage from 0200-0500 Wednesday morning. Refer to attached fire weather forecast.

FIRE BEHAVIOR GENERAL:

Short Range: Fire will continue to be extremely active due to very low fuel moistures, low relative humidities, and high winds associated with predicted cold front passage on Tuesday night/Wednesday morning. Expect rates of spread of 120 to 140 chains/hour in sagebrush/grass fuels, and 60-80 chains/hour in pinyon/juniper woodlands, especially on steeper slopes exposed to the wind. Flame lengths 5-20 feet in sagebrush/grass fuels and 20-50 feet in pinyon/juniper fuels.

Mid Range: Higher humidities, cooler temperatures, and clouds will dampen previously experienced extreme fire behavior Wednesday and Thursday.

Long Range: A drying and warming trend will return the fire behavior to more rapid rates of spread and higher fire intensities. Poorer humidity recoveries and higher winds will promote extreme fire behavior once again.

FIRE BEHAVIOR SPECIFIC:

Divisions L,M,N,O: Expect shallow inversion to break from 0900 to 1100 with active fire spread and increased intensity soon after. Rapid rates of spread from 60-120 chains/hour in sagebrush grasslands and pinyon/juniper woodlands. Flame lengths will vary from 5-20 feet in the sagebrush grasslands and 20-50 feet in pinyon juniper stands. Extreme fire behavior is most likely on steep slopes exposed to winds. Expect spotting up to .2 miles and probability of ignition greater than 90%

Other Divisions: Continued burn out of interior, unburned islands will occur on all other divisions. This burning will mostly occur in the heavier fuels holding fire in the pinyon/juniper woodlands.

AIR OPERATIONS: Air operations will be hampered by inversion until it breaks from 0900 to 1100. Higher winds will hamper air support to fireline operations. Thunderstorm cells will also be a watchout to air operations. The combination of high winds and a Haines index of 5 will make air support difficult to ground forces.

SAFETY: Cold Front - Watch out for wind shift from southeast to southwest as the day proceeds.

Dry Thunderstorms - Microburst winds from 35-55 mph and lightning.

Complex Topography - Steep slopes exposed to the wind will accelerate predicted fire behavior. Anchor and carry the black.

LCES - Lookouts, Communications, Escape Routes, & Safety Zones.