HOURGLASS FIRE

Pingree Park Vicinity
July 1-July 7, 1994
P.N. Omi

Pingree Park overview, September, 1994, showing campus facilities in relation to area burned in the Houglass Fire.

Summary narrative:

The Hourglass Fire was first reported via 911 call to the Larimer County Sheriff on Friday, July 1 1994 at 10:30 am. Personnel at the Sky Ranch summer camp reported the smoke on the ridge to the south between Pingree Park campus and Hourglass Reservoir.

Summer lightning commonly occurs throughout the Rocky Mountains due to localized afternoon convective storm activity. Lightning in the afternoon of June 30, 1994 is the suspected cause of the Hourglass Fire, although the point of origin has never been precisely identified.

Initial attack was conducted by personnel of the Arapaho-Roosevelt National Forest who arrived at the fire site by foot at approximately 12:30 PM. At that time the fire was estimated at approximately 1-5 ac burning in lodgepole pine (Pinus contorta) characterized by fuel model 8 (Timber--tightly compacted needles).

Fuel moistures were extremely low throughout Colorado during spring/early summer of 1994. Several fires ongoing in other parts of the state had shown a tendency toward large fire growth with potentially explosive fire behavior. In fact, in just four days the infamous South Canyon fire would kill 14 firefighters in a blowup near Glenwood Springs.

Table 1 indicates dead fuel moistures in the Pingree Park vicinity prior to the fire. As noted in the table, the moistures were considerably below levels which generally cause concern for firefighters in Colorado.

Table 1. Moistures levels (% oven-dried weight) in various fuel size classes prior to the Hourglass Fire, 1994. Moisture were considerably lower than fire danger thresholds of concern to firefighters.

Fuel Moisture Class	Moisture levels (%) prior to the Hourglass Fire	Moisture levels (%) generally of concern to wildfire fighters
1-hr	3	5
10-hr	5	10
100-hr	7	15
1000-hr	9-11	20

As further indication of fire danger, the National Weather Service in Denver had predicted a Haines Index of 6 for July 1. This index provides an indication of large fire growth potential based on dry bulb and dewpoint temperatures taken at different elevations in the atmosphere, on a scale of 1-6.

Due to erratic winds the fire escaped initial attack at approximately 1:00 PM and quickly grew to 50 acres in size. Fire behavior was characterized by active burning, with surface flame lengths of 10-20 ft and active torching of trees within the fire front (see fire characteristics chart, item 1). Spotting was occurring 1/2 mile in advance of the fire. By this time personnel/engines from Colorado State Forest Service and Larimer County had arrived on the scene along with crews from several local fire departments.

Pushed by W/SW winds, the fire spread to the east toward Pingree Park. Evacuation efforts had begun at Pingree Park, Sky Ranch, and individual homeowners nearby.

By 5:00 PM, the fire had grown to approximately 350 acres and Pingree Park was in imminent danger. Winds were estimated to be 40-50 mph. Forward rate of spread was estimated at approximately 30 ft/min, active crowning was occurring with flame lengths from tree crowns of 100 ft. The fire was spreading along fire front estimated at 1/4 mile. Fireline intensity was estimated in excess of 2000 Btu/ft/sec.

Due to the dense lodgepole pine fuels and resulting fire intensity, successful defensive fire suppression activities at the Pingree Park campus were not feasible. According to one analysis, the indefensibility of Pingree Park "had nothing to do with the skill of personnel or the type/quantity of (suppression resources) on site: it had everything to do with hazardous fuels. Structural defense would have been possible had these fuels been modified/reduced prior to the start of this fire. (see report by P. Summerfelt, Colorado State Forest Service)." There was no time for large-scale mitigation activities due to the limited time between fire detection and involvement with buildings on the Pingree Park campus.

The fire front narrowed to 300 yd width as it moved through the Pingree Park campus (see map), pushed by the high winds. The resulting firestorm destroyed 12 structures and two vehicles with damage to other buildings. Damage to the conference center resulted from radiant heat from burning of surrounding dormitories. Damage to the shop building resulted from sparks igniting a wood pile stacked against the lee side with flames reaching eaves and roof. Personnel on-site kept building damage to a minimum by knocking flames down near the shop. Further, additional building would have been damaged or destroyed if the winds had veered by only a few degrees.

Spotting occurred while the fire moved east through the campus into the meadow south of the Poudre river into an area of heavy downed fuels. This area had been left as a demonstration area following a tornado in 1989 and supported fuel loadings averaging 70 tons/ac, mostly downed trees and logs. The spot fire spread uphill toward Twin Lakes reservoir. After moving through the campus, the main fire spread over and around Hilltop 9361 (see map). The head of the fire widened at this point to the east but also south along the ridge between Hilltops 9361 and 9380 (toward Twin Lakes reservoir). Multiple spot fires (up to 1/2 mi in advance of the fire front) occurred below the Pingree Park Road (FR 146). These spot fires coalesced and quickly spread uphill toward and across the road.

By the evening of July 1, the fire had grown to approximately 800 ac and was threatening the Poudre Springs subdivision located 1/2 mile east of Twin Lakes reservoir. The fire remained active until 4:00 am on July 2 when cooled by humidity recovery. This respite continued until 10:30 am on July 2, when solar radiation reactivated the fire's spread. High intensity runs did not occur, but the fire carried into the crowns of individual and small groups of trees. Short-range spotting was observed. The main concern at this time was the Twin Lakes reservoir area. Ashfall in the Poudre Springs subdivision continued throughout the day. The fire grew to about 1115 acres during this period.

Cloudy conditions and intermittent rainfall (.1-.2 in precipitation, total) slowed fire activity on July 3. An additional 150 ac of fire growth occurred throughout the day. Thereafter, the fire grew very little although individual trees torched amid slow surface fire spread in the interior and along the burn perimeter. During the afternoon of July 5 one spot fire was detected below the ridge east of the Twin Lakes reservoir, west of the Poudre Springs subdivision. According to unpublished reports (P. Summerfelt), the spotfire most likely occurred on July 1. At 10:00 PM on July 5 the fire was declared contained; control was declared on July 7, with a burn area of 1275 ac.

Discussion:

In the aftermath of the Hourglass fire we need to recognize that the fire behaved characteristically of lodgepole pine fires in the Rocky Mountains. Lodgepole pine forests support a mixed fire regime of infrequent, high intensity crown fires and periodic low intensity surface fires. Evidence of both types of fire can be seen within the Hourglass perimeter. When the winds increased due to passage of the dry cold front on July 1, the surface fire was propelled into the tree crowns and pushed along at high velocities, delineating a burn perimeter clearly distinguishable from the adjacent unburned forest in most places. Even so the fire left behind a patchy mosaic of vegetation types both within and along the edges of the fire perimeter.

The post-fire effects will also repeat characteristic patterns of vegetation recovery and soil movement resulting from historic fires which have ignited and spread in the area over past millennia. Lodgepole pine seedlings will proliferate in the burn area due to the seed release prompted by the breaking of cone serotiny. Widespread aspen (Populus tremuloides) suckering will be induced in top-killed stands as well as in areas which had succeeded to conifer overstories in the absence of fire. Pioneer understory plant species associated with lodgepole pine and aspen will reoccupy these sites and increase the overall biological diversity in the short-term. Primary soil-building processes of mass movement and mass transport will take place on steeper slopes in the area; a temporary increase in sediment transport by creeks and rivers may have already taken place. Wind and water transport since the fire has cleared the ash cover and created large patches of bare ground.

The short-term increase in plant biological diversity has been accompanied by a flush of wildlife species drawn to food and cover resources in the burn area. In many respects the rejuvenated area is much more interesting to see and visit. There were obvious negative impacts of the fire (destruction of property) but these arise largely because humans choose to live in and enjoy the products of the forest, including recreation, water, and wildlife. This mixture of positive and negative impacts is characteristic of both wild and prescribed fires. One of the challenges for land managers is to accept the beneficial aspects of wildfires and reject the detrimental features of intentional fire applications.

Had the rains not extinguished the flames and smoldering combustion, it is likely that the fire would have burned considerably larger and longer. In the absence of humans, the fire conceivably could have continued to grow throughout the summer, with hot spots alternately roaring to life and sputtering quiescently in response to changes in environmental moisture and winds as the fire extended over the landscape. In fact, human influences probably had little influence on the fire's ultimate size and shape, in spite of the $10.5 million (USFS 1995) expended to suppress the fire. Other indications of the cost and magnitude of effort expended in suppression of the Hourglass Fire are summarized in Table 2.

Table 2. Hourglass Fire Summary Assessment

Indicator	Magnitude
Fire area	1275 ac
Firefighting resources	Firefighters (602), Air tankers (9), Helicopters (4), Fire Engines (15)
Suppression costs	$10.5 million (source: USFS 1995)
Damages	$2.8 million (incl. structures, contents, conference cancellations)
Cost + damage per acre (est.)	$10,431

Salvage logging underway as of 1996 is creating defensible spaces around the new construction and buildings which survived the Hourglass fire. The remaining burn area provides an ideal laboratory setting for fire ecology investigations. From a fuel management standpoint, the unsalvaged areas within the burn perimeter should be monitored over the next several years as the standing dead trees fall over and become part of the dead, downed woody fuels complex during the next decade. Based on a previous study following the tornado blow-down of 1989, we can expect that unsalvaged areas could support from 25-136 tons per acre (average 71 tons/ac), primarily in the larger fuel diameter size classes. The fire potential in these areas could be considerable, especially when these dead fuel loads are combined with the seedling regeneration which will occupy the site.

Acknowledgments: Much of the factual information on fire growth is from an unpublished report provided by Paul Summerfelt of the Colorado State Forest Service.

Literature Cited:

USFS. 1995. Fire suppression costs on large fires. A review of the 1994 fire season. USDA Forest Service, Fire and Aviation Management.