

## Treatment Implementation

**Logging.** Logging was conducted in January-February 2006 on deep, compacted snow to minimize damage to soils. Road access was maintained by a commercial snow blower. Harvest had been scheduled for the previous winter, but was delayed by record drought and virtual absence of snow.

Larger trees were felled with chainsaws and smaller trees were cut with a Timco mechanical faller (John Deer 653E). Directional felling was required to avoid disturbance to control plots. If possible, tree canopies were yarded while attached to boles to reduce fuel loadings, however, most limbs were broken during falling and yarding.



Rubber-tired and tracked skidders (John Deere 550) were used to yard boles to a road-side landing, ~250 m (~820 ft) west of the study area.



A hydraulic log loader (John Deer 690ELC) was then used to delimb and cut logs to length at the landing.



### Fuel reduction treatments

#### Pile and burn treatments (PB)

Logging slash was piled by hand to create conditions where most of the ground surface was not burned (for comparison with broadcast burned treatments) (Fig. 23). Piles were located external to areas that would be sampled for vegetation and soils.

Piles were constructed in June 2006 and were covered with polyethylene film to shed water. They ranged in height from 1.8-3.0 m (6-10 ft) and in diameter from 2-4 m (6.5-13 ft).



Fig. 23. Areas between slash piles remained unburned.

Following an extended period of dry weather in October, piles were ignited on 2 November (Fig. 24) and burned to completion the next day (95-100% consumption). At 09:30 hr, temperature was 5°C (41°F), relative humidity was 100%, winds were SW at 3.2 km/hr (2 mph), and cloud cover was complete. Two-day rainfall (2-3 November) at the McKenzie Bridge Ranger Station (451 m, 1480 ft elevation) totaled 3.3 cm (1.3 in).



Fig. 24. A pile and burn unit before (27 Sep 2006), during (2 Nov 2006), and after treatment (28 Jun 2007).

## Broadcast burn treatments (BB)

Fire lines (~50 cm, 20 in wide) were constructed around each broadcast burn unit (Fig. 25). Within these lines, duff was removed to mineral soil.

A hose lay with multiple pumping stations was used to distribute water. Hoses extended as far as 0.9 km (~0.6 miles) to the most distant treatment, requiring significant coordination of effort as demand changed from holding to mop-up among treatment units.

Water was hauled by fire engines from a distance of 4.8 km (3 miles) and used for pre-burn wetting of areas adjacent to experimental units, holding, and mop-up operations.



**Fig. 26.** Broadcast burning on 28 September 2006.



**Fig. 25.** Broadcast burn treatment units showing fuel loadings prior to burning.

Slash was burned on 28 September 2006 (Fig. 26). Burning occurred between 11:15 and 14:30 hr. Air temperatures were 70-75°F (21-24°C), relative humidity 25-27%, and wind speeds 0-5 km/hr (0-3 mph), with no cloud cover. Fuel moisture prior to ignition averaged 12% (10-hr), 16% (100-hr), and 28% (1000-hr). Post-harvest loadings of fine fuels (1-hr to 100-hr) averaged 63 Mg/ha (25.2 tons/ac).

Individual experimental units burned to completion within one-half to two hours of ignition. Flame lengths averaged 1-2 m (3-6 ft) with maxima of 2.4 m (8 ft) (Fig. 26).

Consumption of fine fuels averaged 67-87% among experimental units (Fig. 27). Areas that were shaded by forest edge burned less intensively, as did areas lacking woody debris (Fig. 27, middle right).



**Fig. 27.** Variation in ground-surface conditions following broadcast burning, including areas with exposed mineral soil and unburned vegetation (29 September 2006).