

EFFECTS OF SLASH PILE BURNING
ON CHEMICAL AND PHYSICAL SOIL PROPERTIES

A Thesis

Presented in Partial Fulfillment of the Requirements for the

DEGREE OF MASTER OF SCIENCE

Major in Forest Resources

In the

UNIVERSITY OF IDAHO

By

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ABSTRACT

To determine the initial effects of slash pile burning on chemical and physical properties in the Vassar soil series, soil samples were collected before and after burning slash piles with depths of .5m (9kg/m², 42 t/a), 1m (45 kg/m², 201 t/a), 2m (91 kg/m², 405 t/a), and 3m (145 kg/m², 645 t/a), as well as in unburned and burned litter plots. Soils were analyzed for exchangeable calcium, magnesium, potassium, sodium and for available phosphorus, pH, organic matter, nitrate-nitrogen, total kjeldahl nitrogen (TKN) and cation exchange capacity. Bulk density, particle size distribution and infiltration data were also analyzed. Burning significantly increased surface soil (2.5 cm) levels of exchangeable magnesium, potassium, sodium and of available phosphorus, nitrate-nitrogen, and pH. Exchangeable calcium, organic matter, cation exchange capacity and TKN decreased. In the lower sampling depth (12.5 cm) more severe fires resulted in an increase in exchangeable calcium, magnesium, sodium, and in available phosphorus, pH and nitrates. All other chemical properties measured were unchanged. Initial infiltration rates and infiltration capacity were significantly decreased by burning larger amounts of fuel. Bulk density increased as a result of burning on dry (60% moisture) soil as compared with wet soil (90% moisture). The soil textural class did not change, but burning reduced clay and increased sand-silt particles.

Key Words: Fire, soil, chemical, physical, infiltration, nitrogen, phosphorus, and slash-piles.

Study Site

The study was located on the University of Idaho Experimental Forest on the Flat Creek Unit, stand 01-10-01, at an elevation of 1,100 meters. The soil is of the Vassar series. The climate is primarily modified maritime and the average annual precipitation is 63.5 centimeters. The 1.6 ha (4 acres) area was clear-cut in October of 1981. Forty soil samples were taken prior to logging.

Date: 4 April 1985

Researcher/s: Leon Nevenschwander, Doug Davenport

Project Title: Effects of Slash Pile Burning on Soils

Subject: Effect of Fire on soils

Keywords: Soil, burning, regeneration, slash piles

Abstract: Soil samples were collected before and after burning of slash piles ranging from 0.5 to 3 m. in height. Samples were also taken from burned and unburned plots ~~and~~ litter plots. Samples were analyzed for nutrient content, CEC, pH, organic matter content, bulk density, particle size distribution and infiltration.

Location:

Unit of the Forest Flat Creek

T 40N R 3W S 7 NW $\frac{1}{4}$, SE $\frac{1}{4}$

Stand 1-10-1

Size of Area 5 acres

General Description of Area clearcut, cut 1981

Plot or Area Designation: main ridge - rebar posts with metal tags at the center of each plot (48 plots)

Date Begun: Jan 1981 Completion date (expected) continuing (1987)

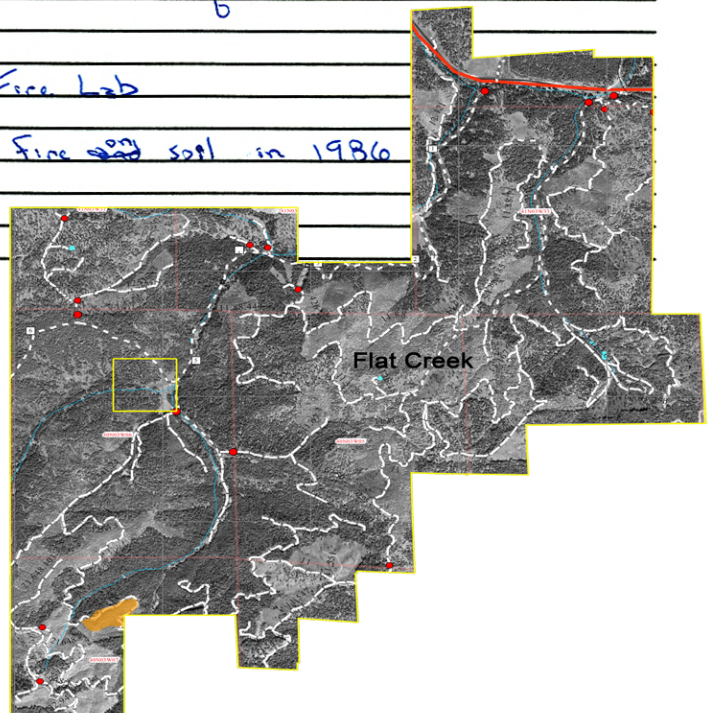
Papers or Thesis Resulting: Soil Properties in the Vassar Series

Davenport, Doug M.S. thesis Effects of Slash Pile Burning on Chemical and Physical
(same title) 26 pp. Proceedings: Soil Science

Funding Source: U.S.F.S. INT Northern Fire Lab

Future Plans: re-evaluate the effect of fire on soil in 1986

Davenport, Doug-
Effects of slash pile burning on chemical and physical soil properties
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Location of Complete Research:

Author & Title: **Davenport, Douglas D.**
Effects of Slash Pile Burning on Chemical and Physical Soil
Properties

University of Idaho Library:

Call Number-**S608.D38**

College of Natural Resources:

Department- **Forest Resources**

Other Sources: