Impacts of Prescribed Burning on the Survival of Douglas-fir and Ponderosa Pine in the Boise National Forest

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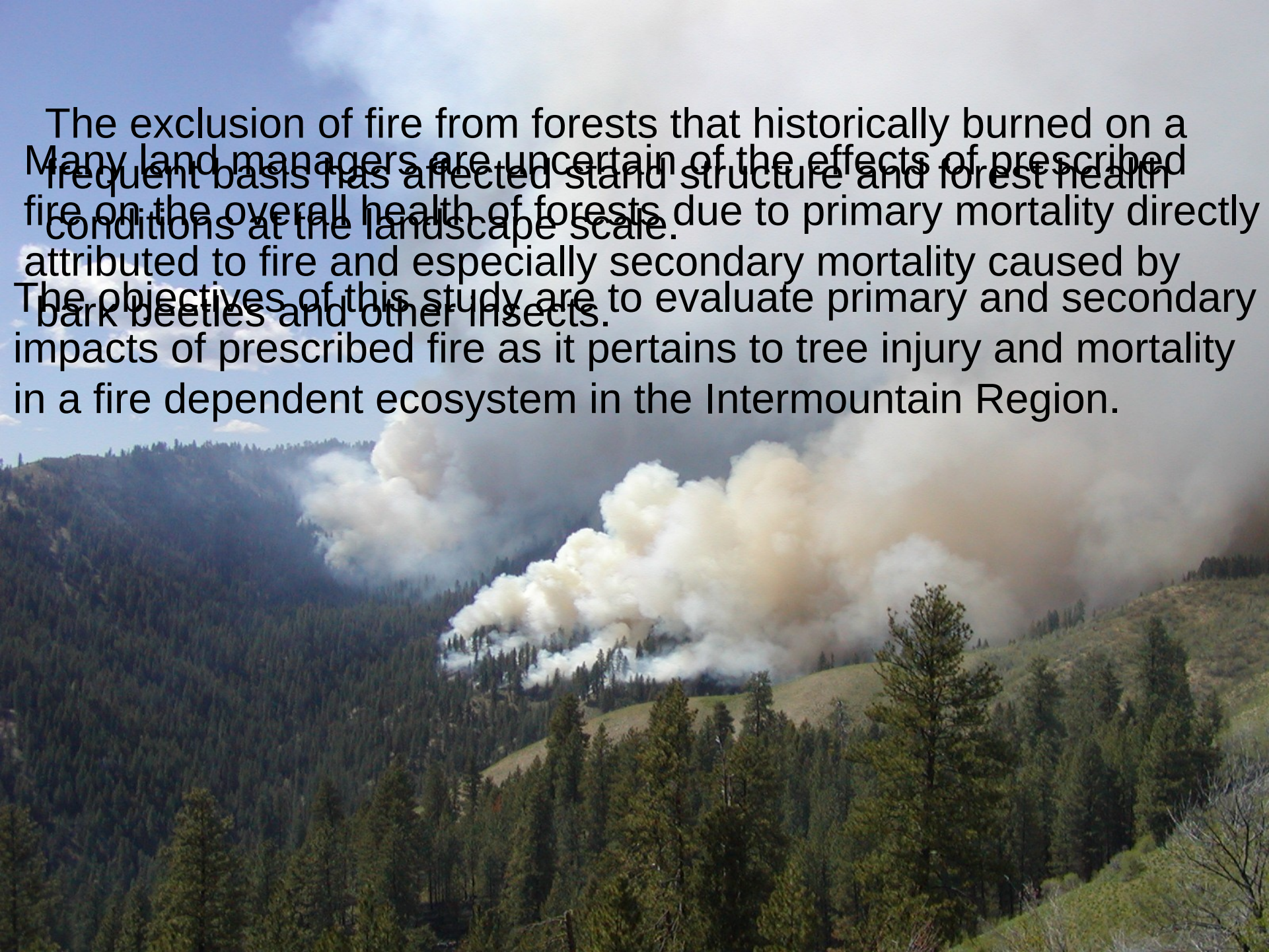


The exclusion of fire from forests that historically burned on a frequent basis has affected stand structure and forest health conditions at the landscape scale.

Many land managers are uncertain of the effects of prescribed fire on the overall health of forests due to primary mortality directly attributed to fire and especially secondary mortality caused by bark beetles and other insects.

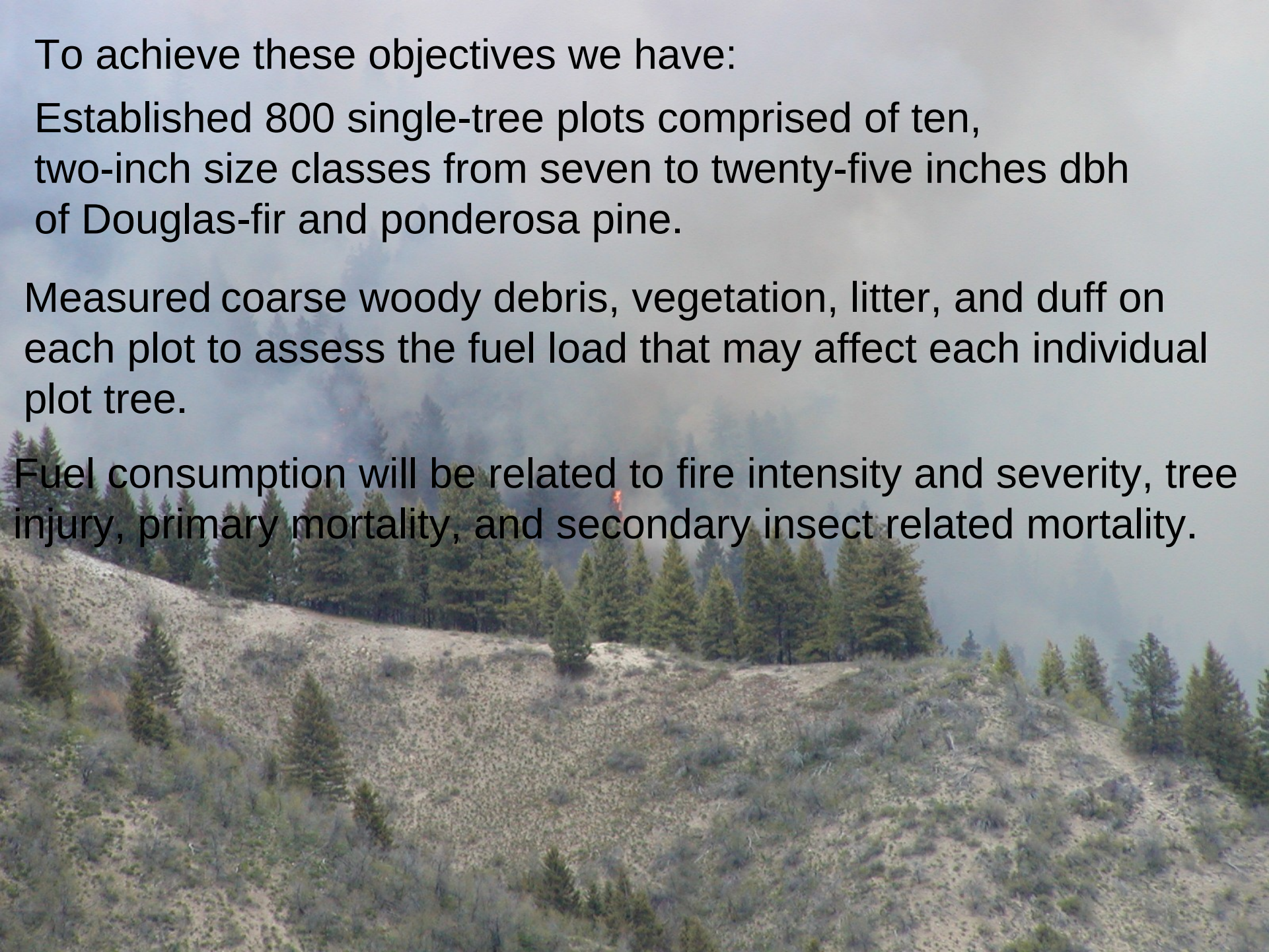
The objectives of this study are to evaluate primary and secondary impacts of prescribed fire as it pertains to tree injury and mortality in a fire dependent ecosystem in the Intermountain Region.

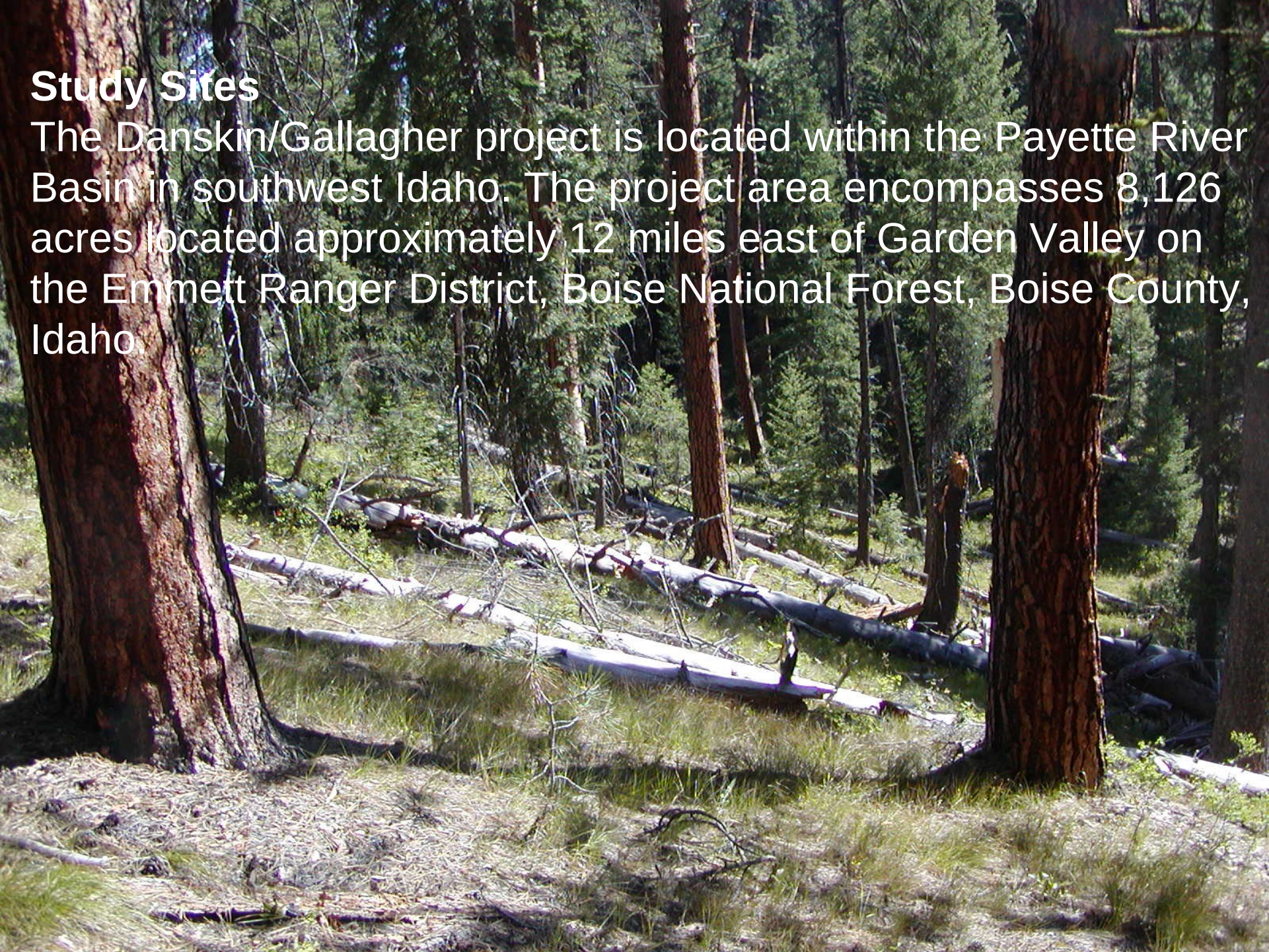
To achieve these objectives we have:

Established 800 single-tree plots comprised of ten, two-inch size classes from seven to twenty-five inches dbh of Douglas-fir and ponderosa pine.

Measured coarse woody debris, vegetation, litter, and duff on each plot to assess the fuel load that may affect each individual plot tree.

Fuel consumption will be related to fire intensity and severity, tree injury, primary mortality, and secondary insect related mortality.





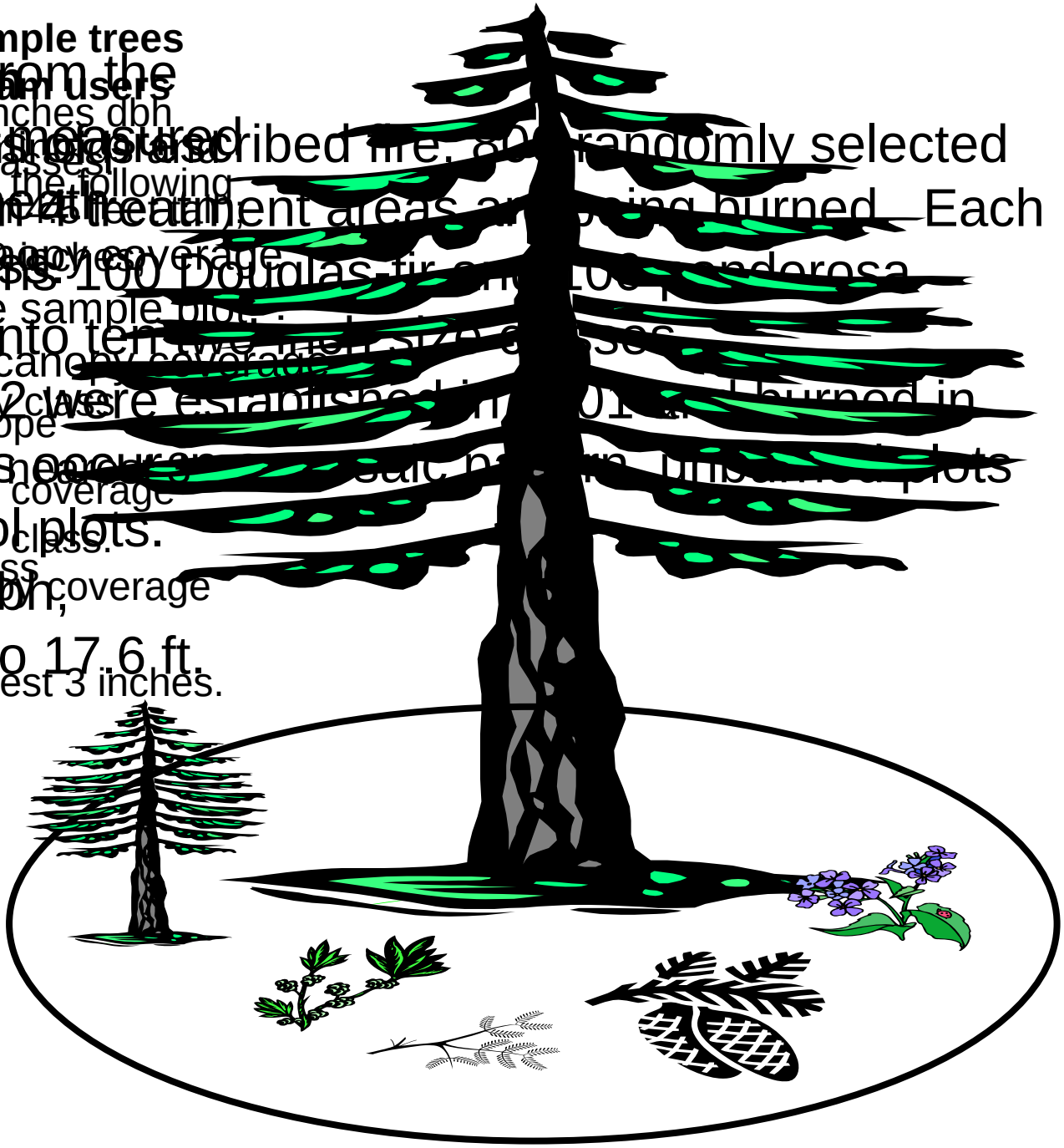
Study Sites

The Danskin/Gallagher project is located within the Payette River Basin in southwest Idaho. The project area encompasses 8,126 acres located approximately 12 miles east of Garden Valley on the Emmett Ranger District, Boise National Forest, Boise County, Idaho.

Site characteristics for sample trees

Record conifers less than 6 inches dbh by species in the following classes:

a. Total area of 1 inch coverage
b. 1 inch to 3 inches
c. 0 3 inches
d. 3 inches
e. Percent of estimated canopy coverage
f. Slope in percent
g. Basal area using a relascope
h. Percent by species and class.
i. Tree position or crown class
j. Percent of estimated canopy coverage
k. Fuel model
l. Slope position
m. Slope horizontal shape



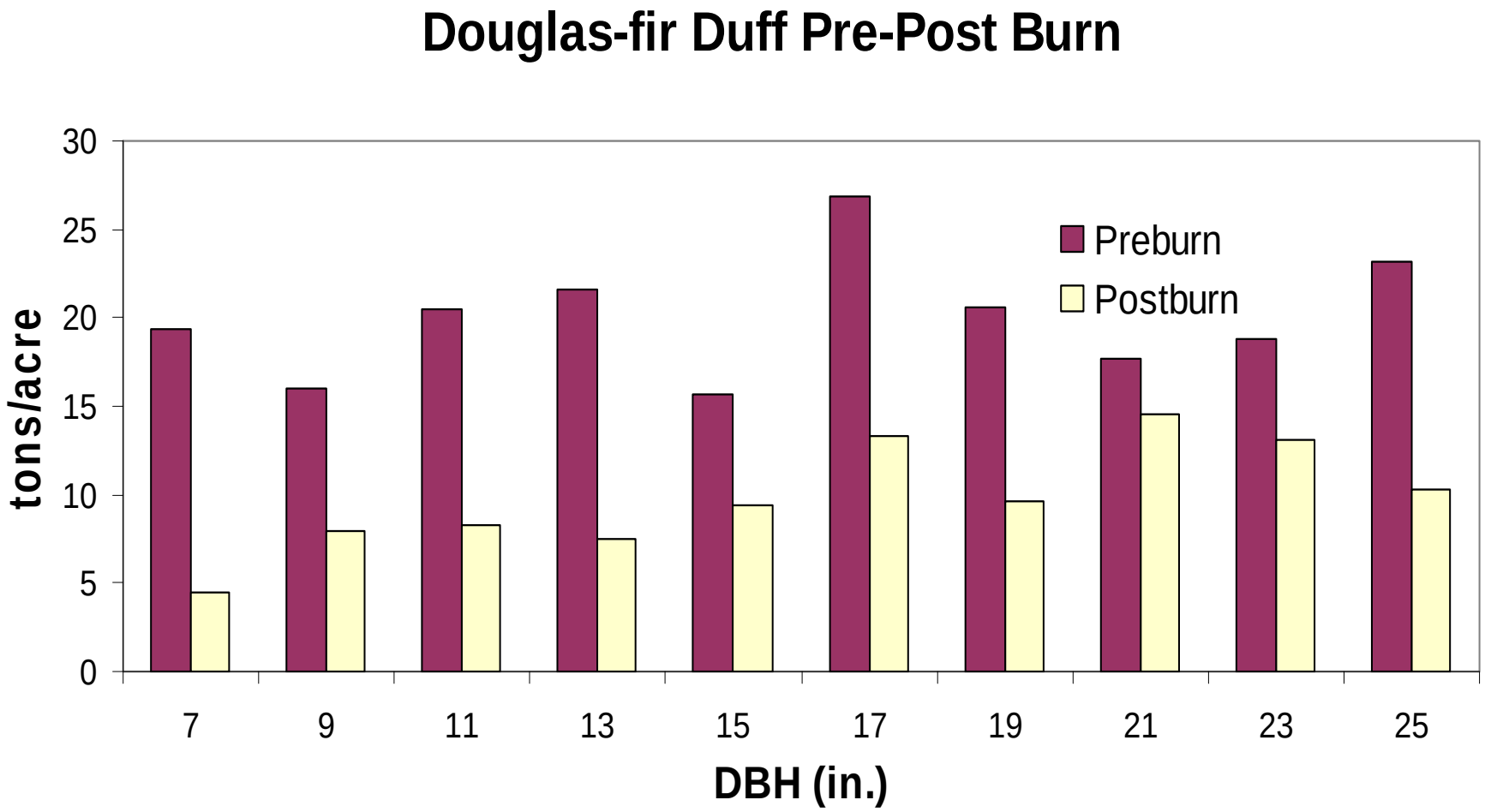
Landscape staples were used to determine duff consumption.

Plot trees were well marked and
identified with individual tree tags.

The fire treatment was applied aerially during the spring of 2002.

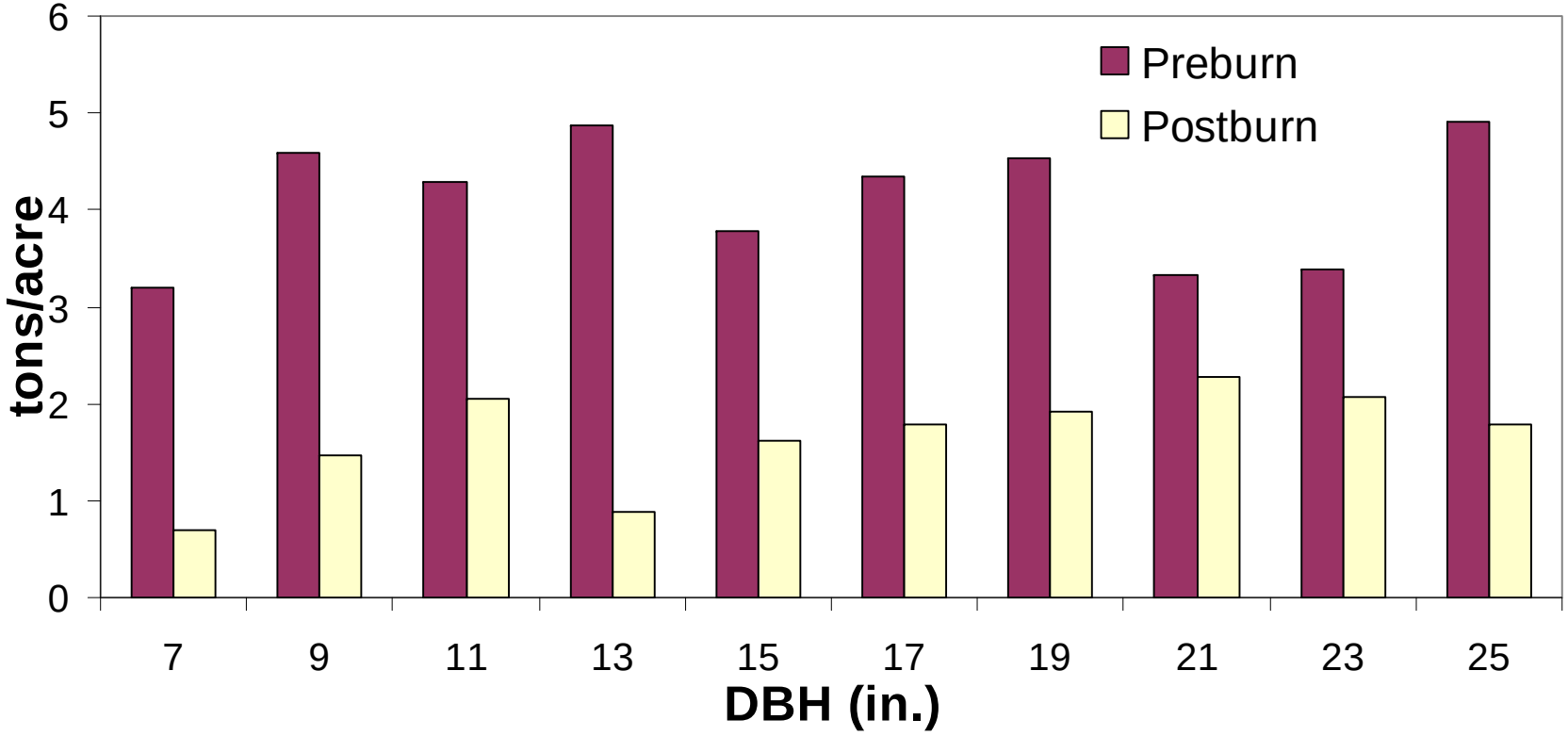
Sixty-one Douglas-fir and 129 ponderosa pine trees were treated with prescribed fire.

Postfire data was collected in 2002 to assess fuel reduction and fire impacts.



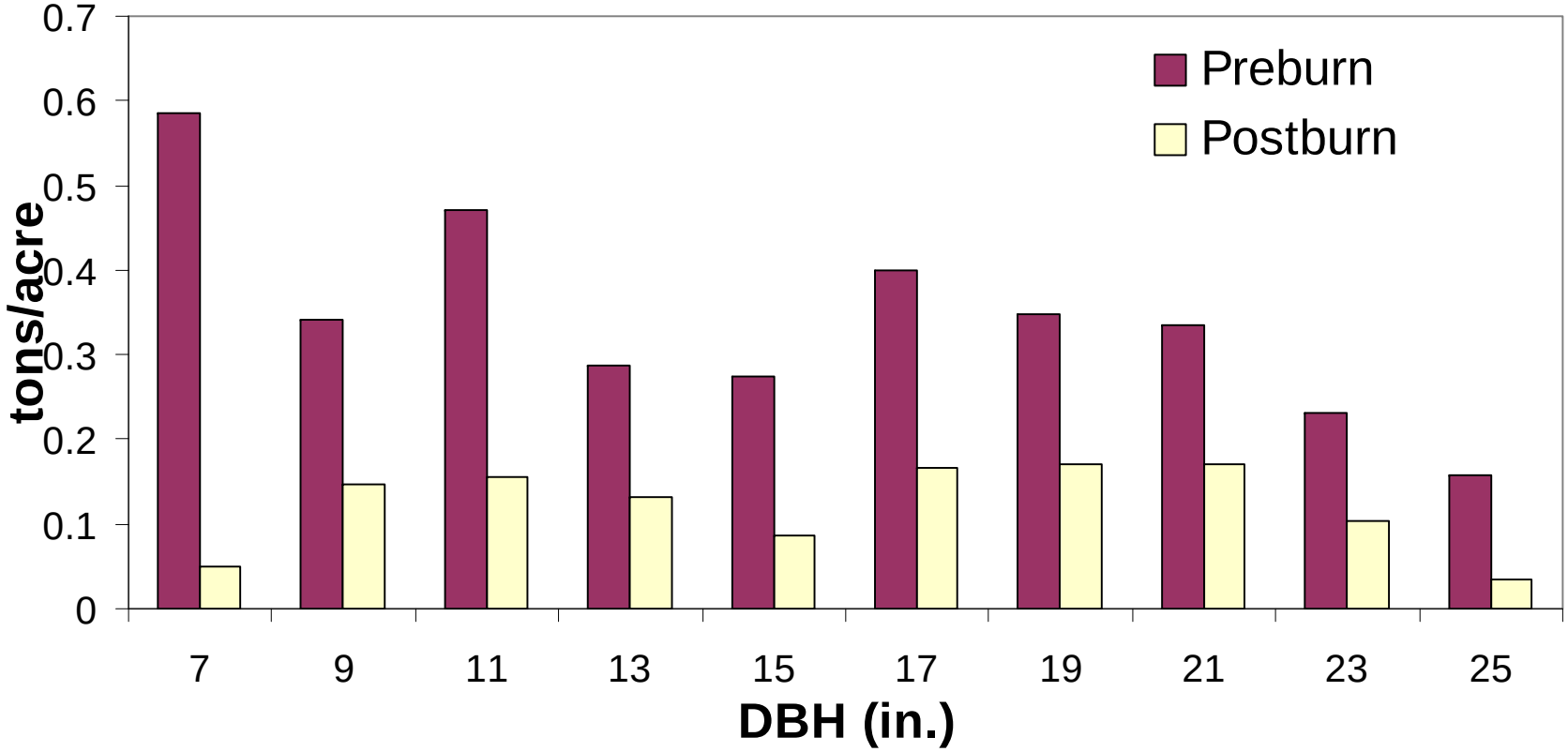
An average of 10 tons/ac or 47% of the duff layer beneath Douglas-fir trees was consumed by prescribed burning.

Douglas-fir Litter Pre-Post Burn



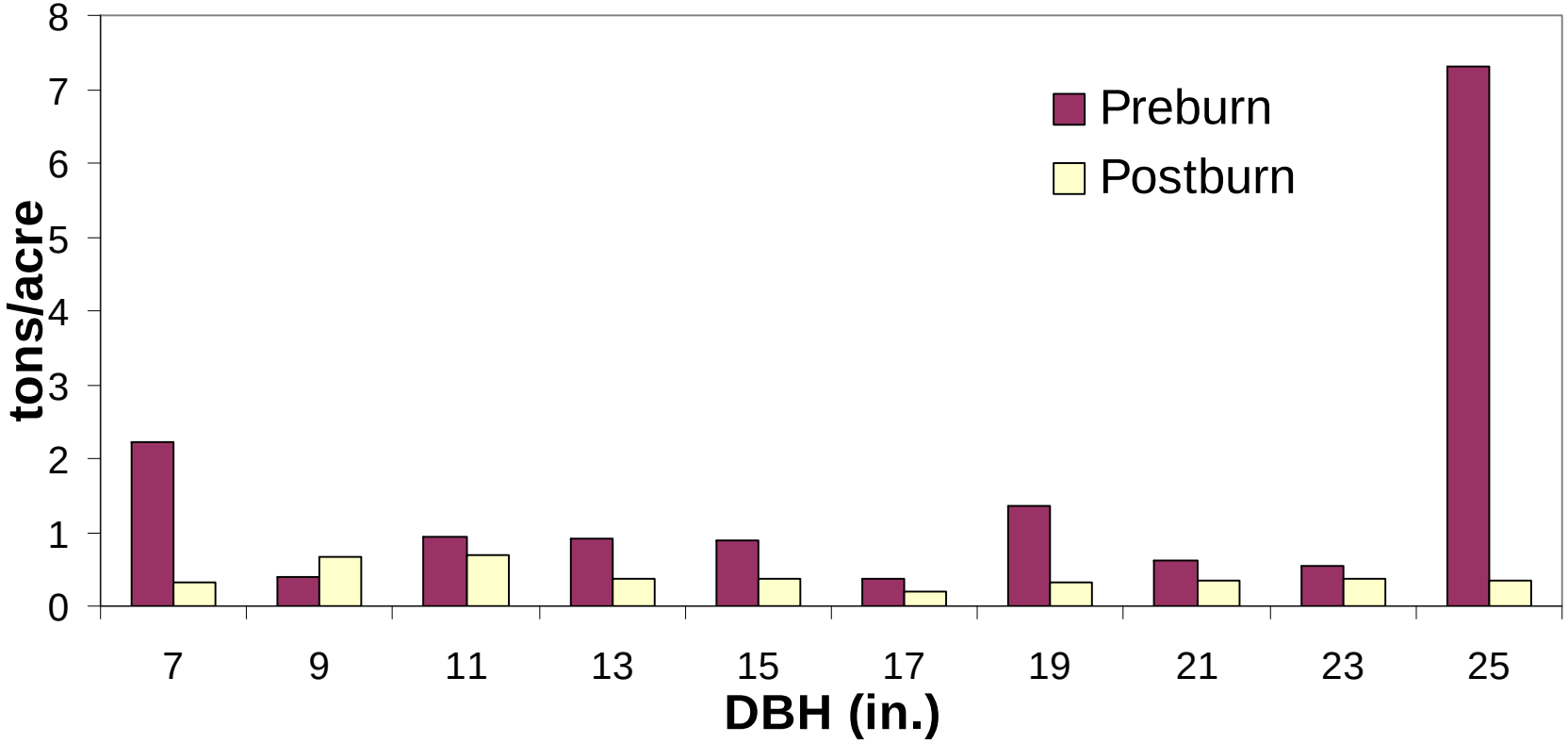
An average of 2.4 tons/ac or 56% of the litter layer beneath Douglas-fir trees was consumed by prescribed burning.

Douglas-fir 10HR Fuels Pre-Post Burn



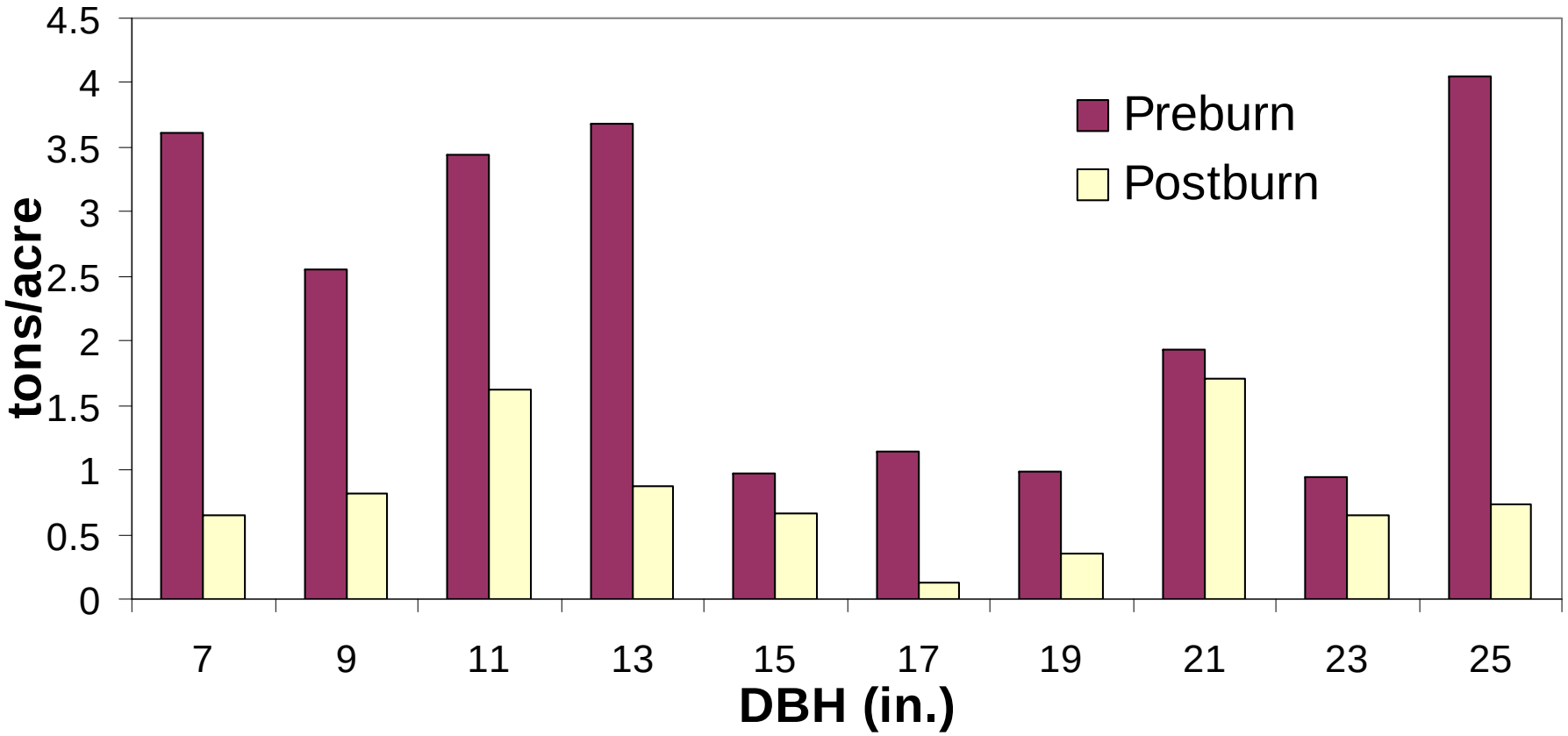
An average of 0.24 tons/ac or 60% of the 10HR fuels beneath Douglas-fir trees was consumed by prescribed burning.

Douglas-fir 100HR Fuels Pre-Post Burn



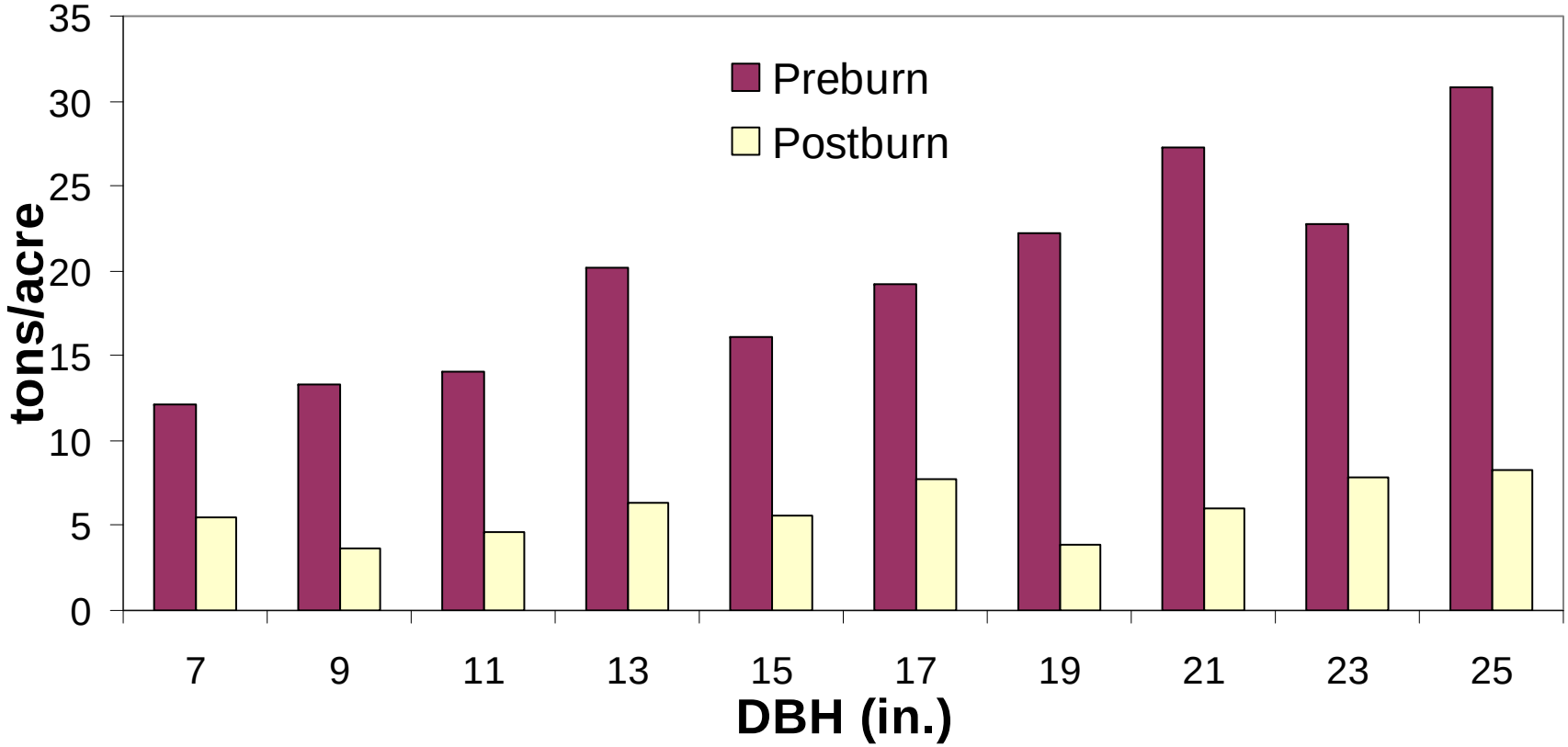
An average of 0.80 tons/ac or 30% of the 100HR fuels beneath Douglas-fir trees was consumed by prescribed burning.

Douglas-fir 1000HR Fuels Pre-Post Burn



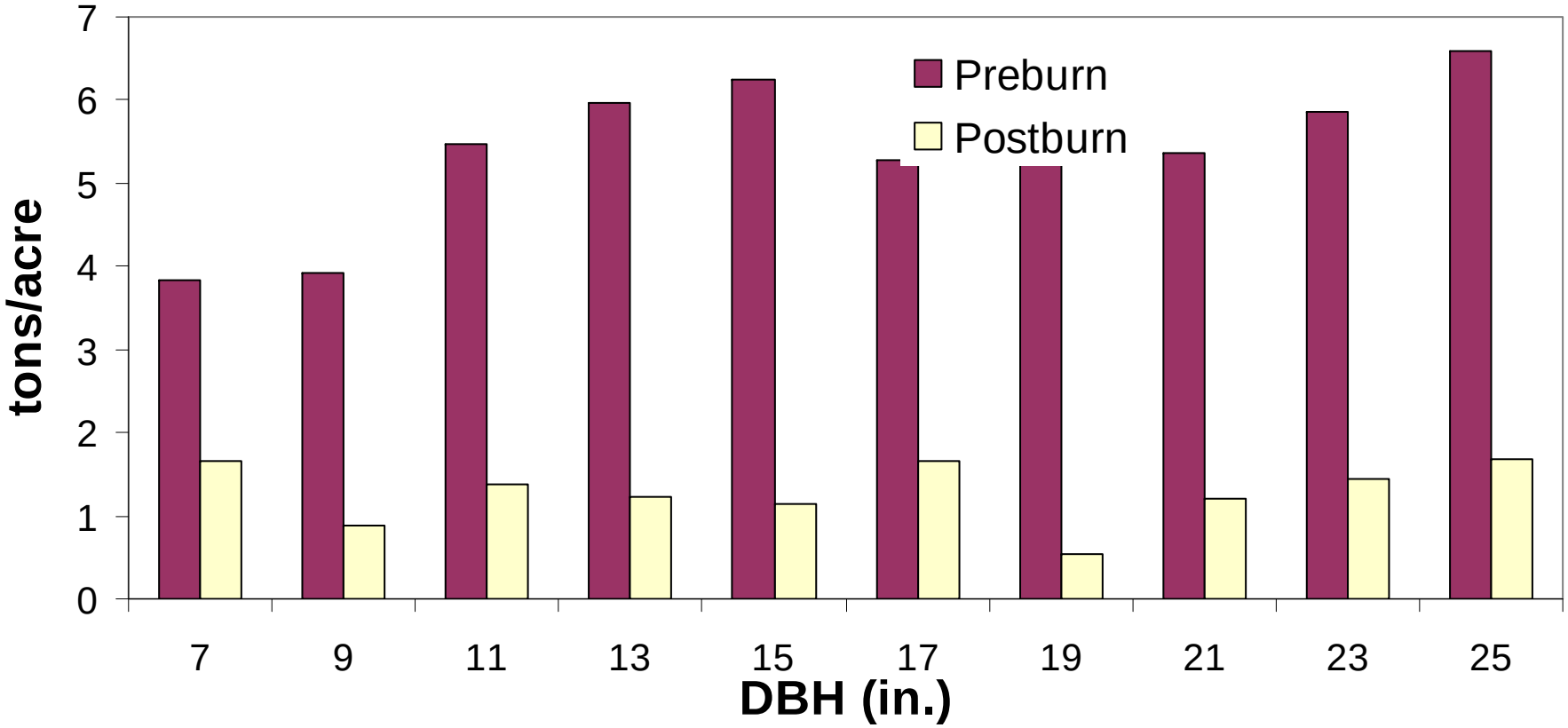
An average of 1.4 tons/ac or 32% of the 1000HR fuels beneath Douglas-fir trees was consumed by prescribed burning.

Ponderosa Pine Duff Pre-Post Burn



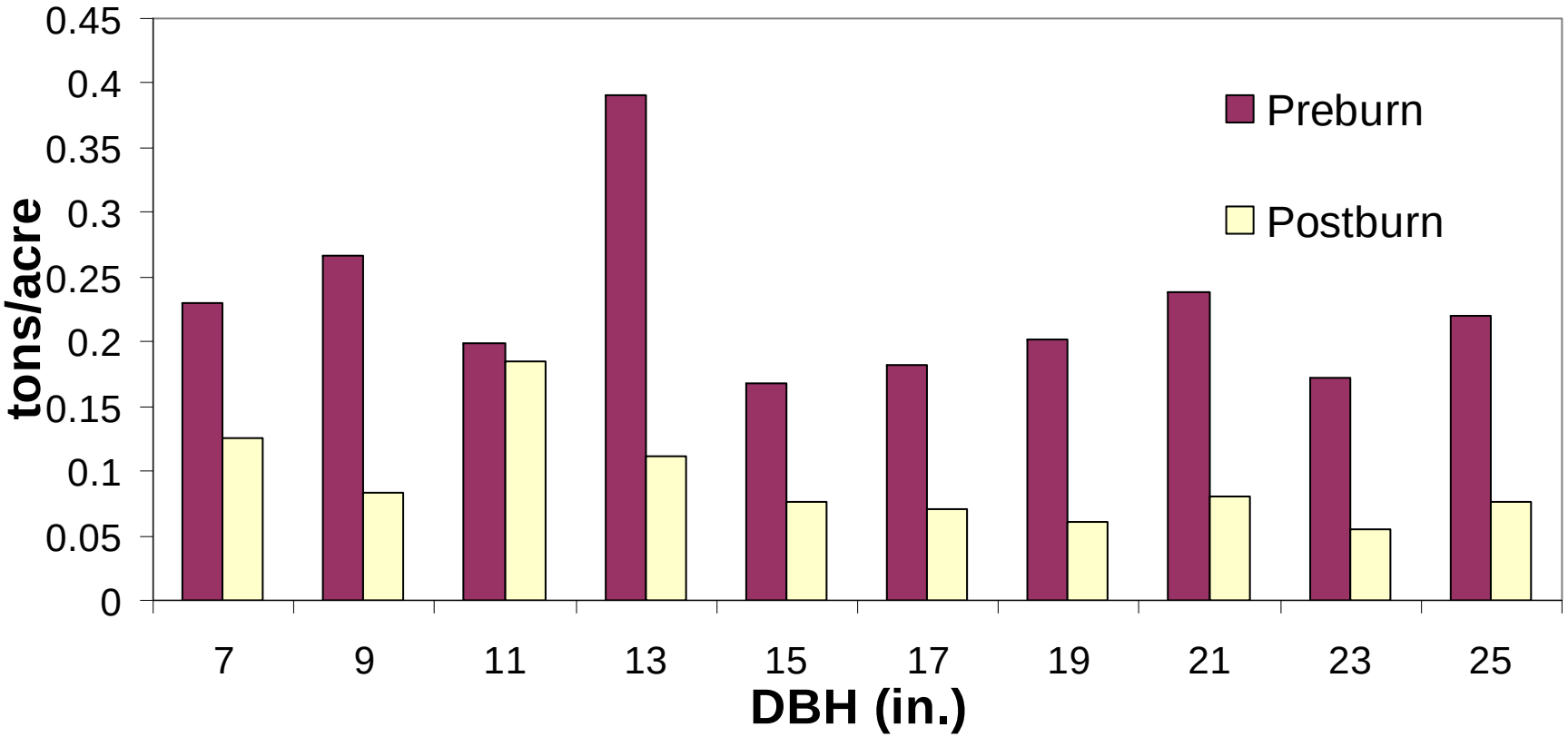
An average of 14.1 tons/ac or 64% of the duff layer beneath ponderosa pine trees was consumed by prescribed burning.

Ponderosa Pine Litter Pre-Post Burn



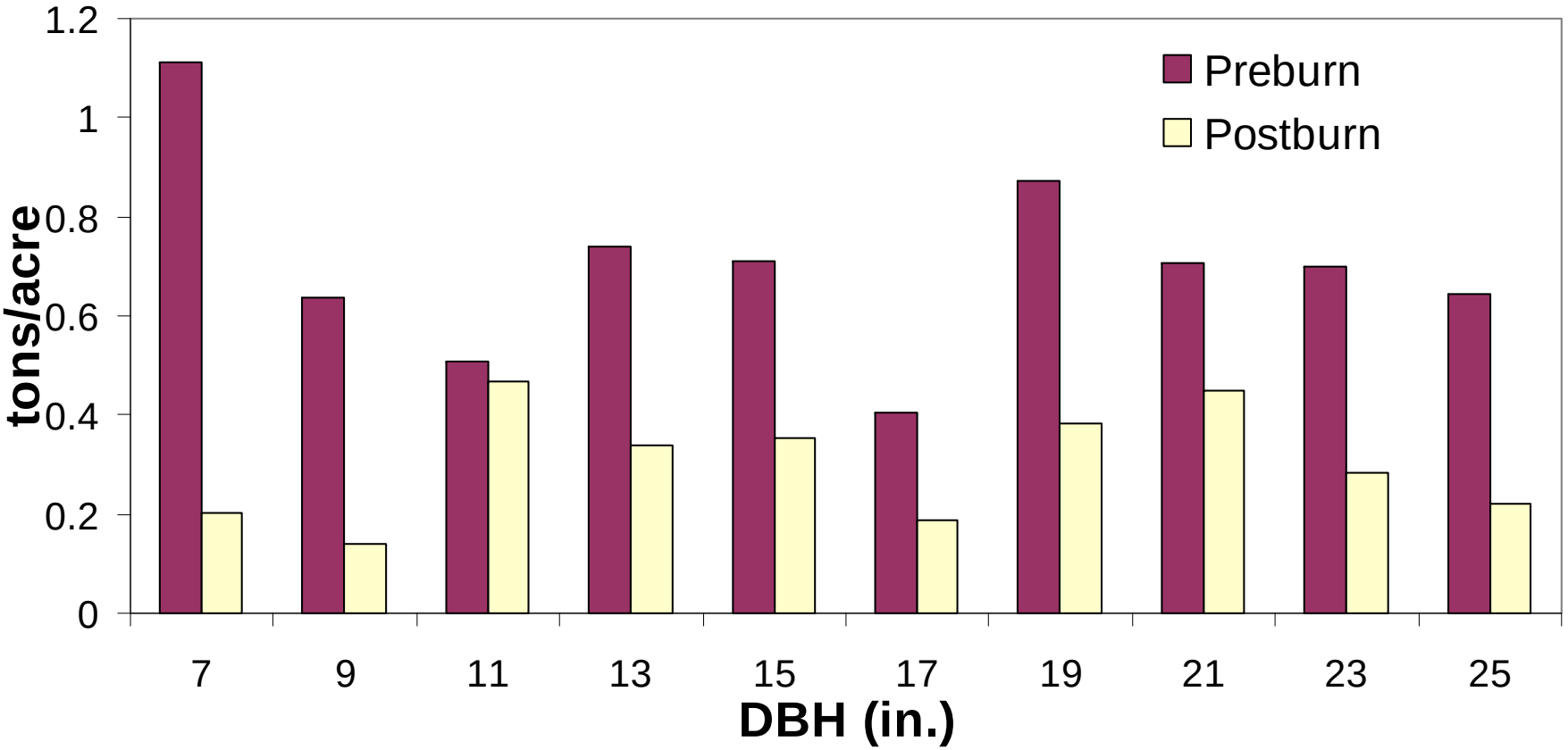
An average of 4.1 tons/ac or 75% of the litter layer beneath ponderosa pine trees was consumed by prescribed burning.

Ponderosa Pine 10HR Fuels Pre-Post Burn



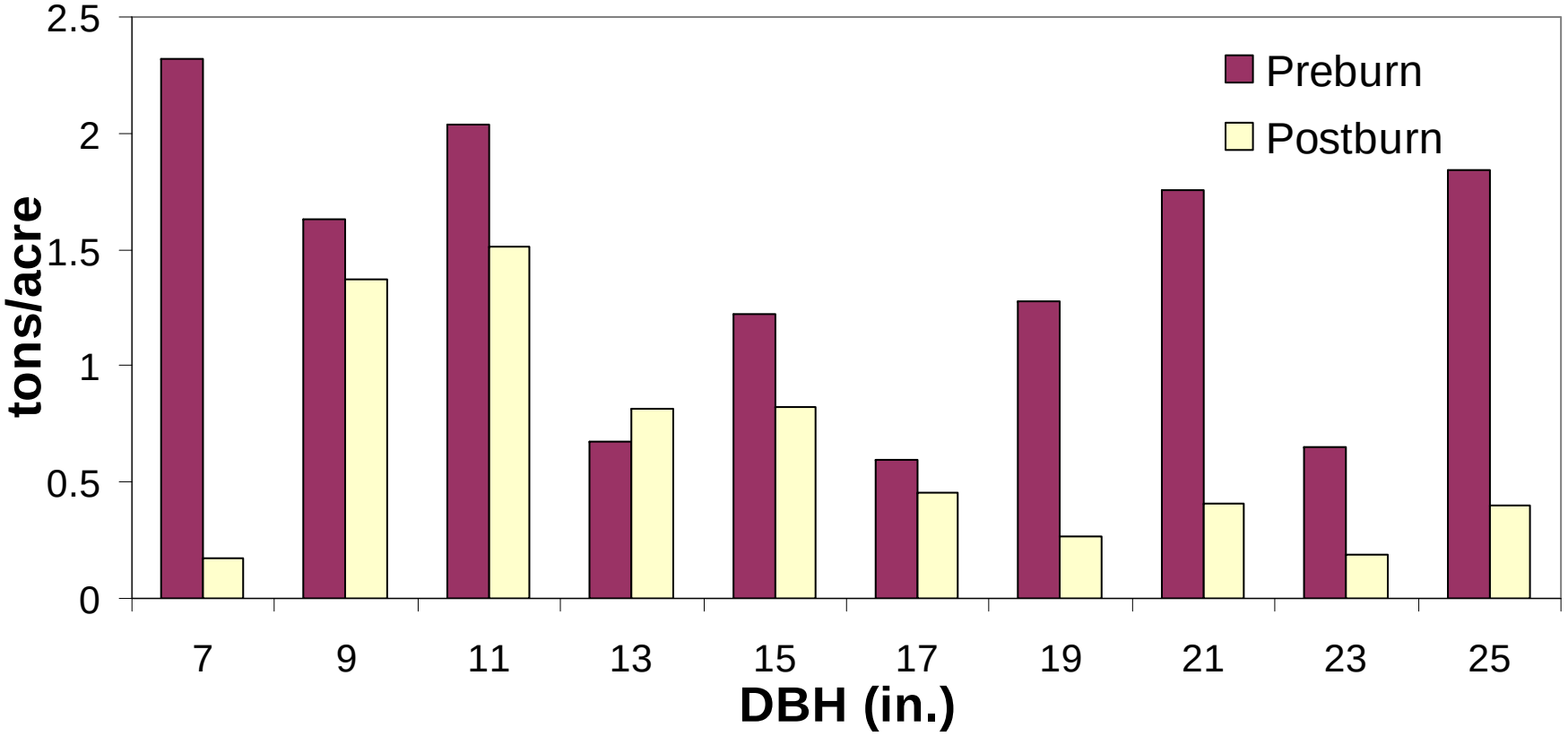
An average of 0.15 tons/ac or 45% of the 10HR fuels beneath ponderosa pine trees was consumed by prescribed burning.

Ponderosa Pine 100HR Fuels Pre-Post Burn

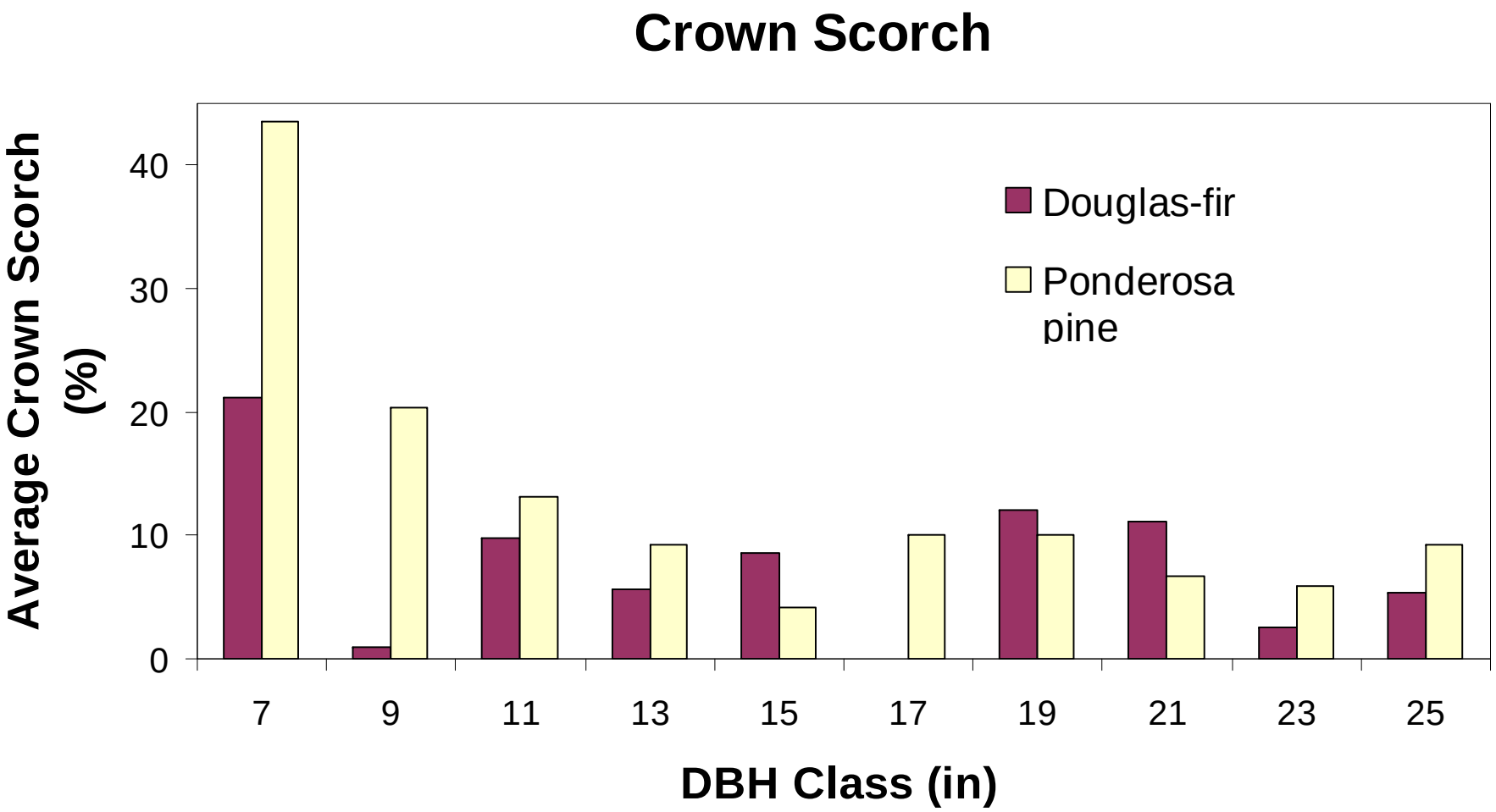


An average of 0.50 tons/ac or 50% of the 100HR fuels beneath ponderosa pine trees was consumed by prescribed burning.

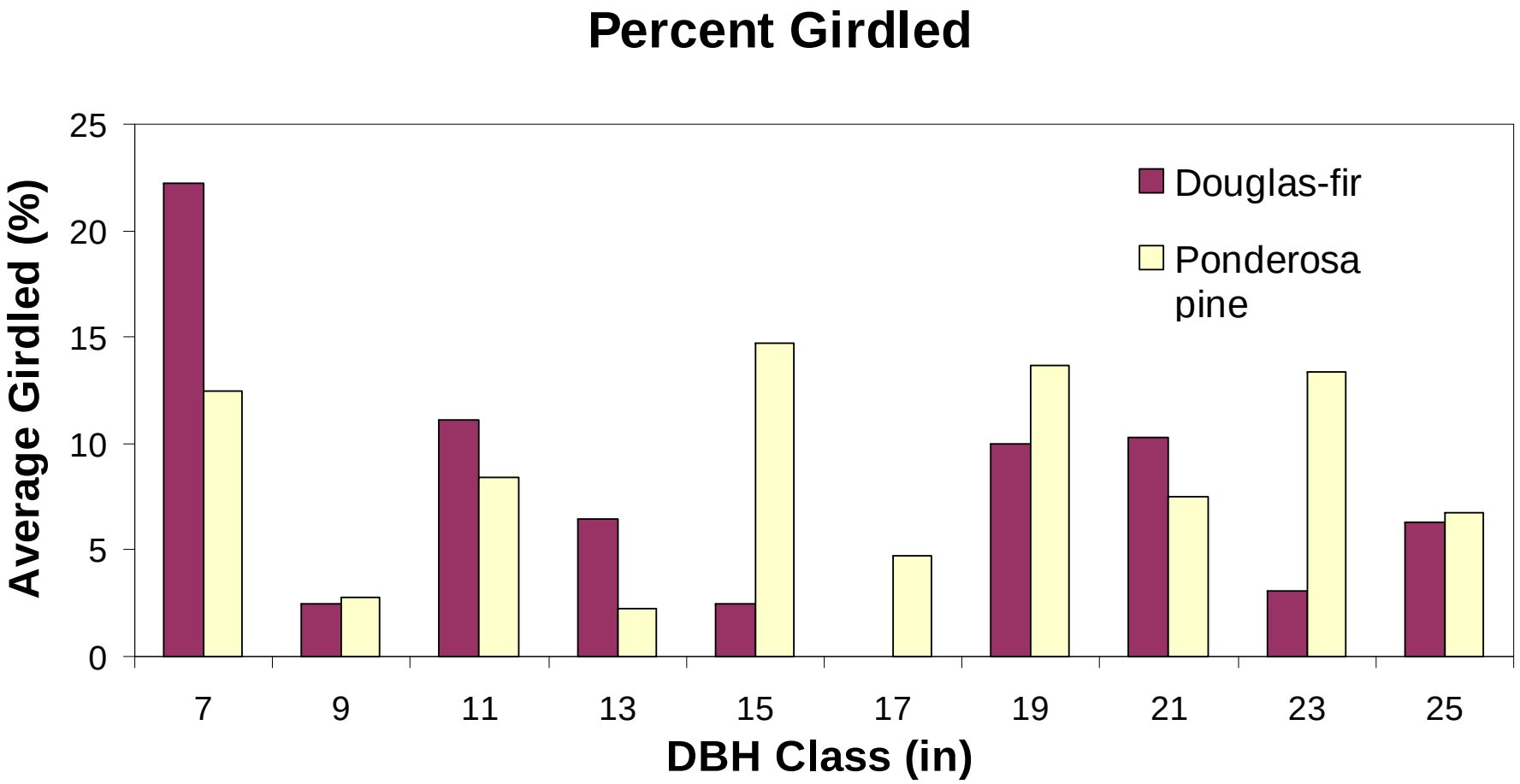
Ponderosa Pine 1000HR Fuels Pre-Post Burn



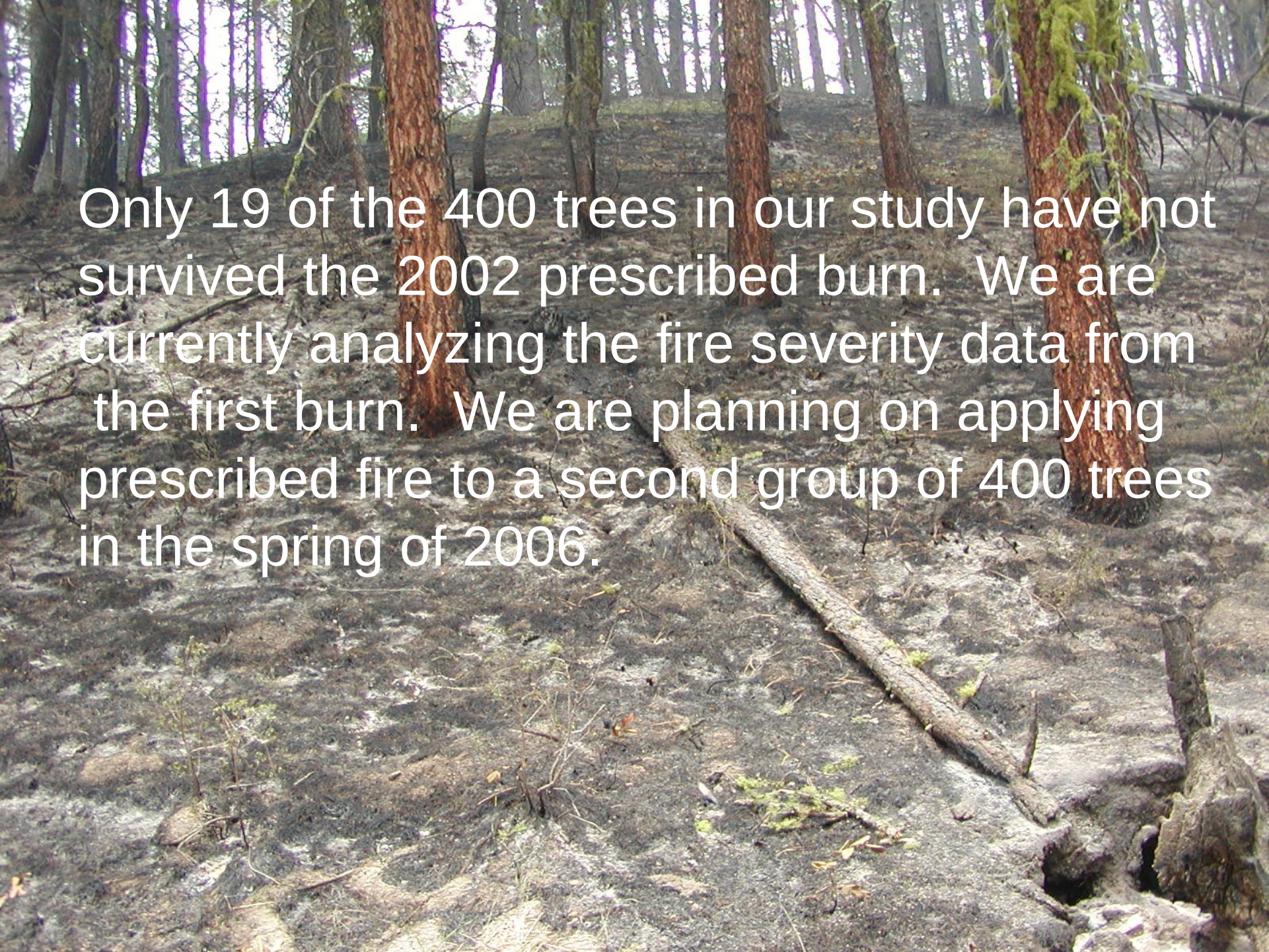
An average of 1.0 tons/ac or 64% of the 1000HR fuels beneath ponderosa pine trees was consumed by prescribed burning.



Percent crown volume scorched for burned trees in treatment areas 1 and 2 by DBH class.



Percent basal girdling estimated from four cambium samples for burned trees by DBH class.



Only 19 of the 400 trees in our study have not survived the 2002 prescribed burn. We are currently analyzing the fire severity data from the first burn. We are planning on applying prescribed fire to a second group of 400 trees in the spring of 2006.