PRESCRIBED BURNING TO PROTECT LARGE DIAMETER PINE TREES FROM WILDFIRE -

Can we do it without killing the trees we're trying to save?

Sharon Hood and Michael Harrington
USDA Forest Service, RMRS, Fire Sciences Lab, Missoula, MT

PROBLEM:
Prescribed burning to reduce fuel in some areas with large diameter and old-growth trees is causing significant mortality of these high-value trees even with low intensity fires. A probable cause is the extended burning of large duff accumulations resulting from 100 years of fire exclusion. Burning when duff moistures are low can lead to root mortality and basal girdling from consumption of the duff mounds. Even with mechanical thinning to reduce ladder fuels and the probability of crown damage, the problem of deep duff mounds and below-ground damage still exists.

OBJECTIVES:
(1) Evaluate the biologic effectiveness and economic feasibility of removing duff mounds to reduce heat injury and large tree mortality
(2) Develop prescribed fire guidelines that address fuel problems but reduce damage to large-diameter ponderosa and Jeffery pines in areas of deep duff

SITES:
* Eagle Lake RD, Lassen NF, California. Burned June 2005
* Lassen Volcanic National Park, California. Burned October 2005

TREATMENTS:
We paired trees in each treatment, raking all litter and duff from 1 tree in each pair down to mineral soil in a 1 meter radius around the bole, and leaving the other tree unraked.

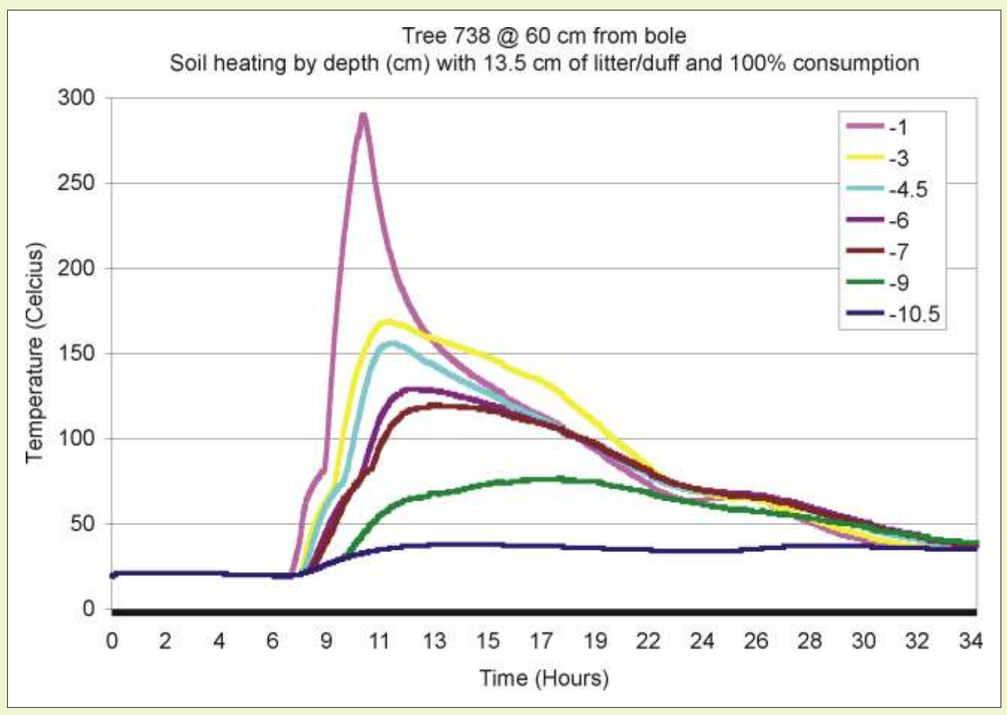
* Prescribed burn natural fuels (park)
* Prescribed burn activity fuels from thinning (forest)
* Prescribed burn masticated activity fuels from thinning (forest)
* Unburned control (forest and park)


Collecting fuel moisture samples during burn

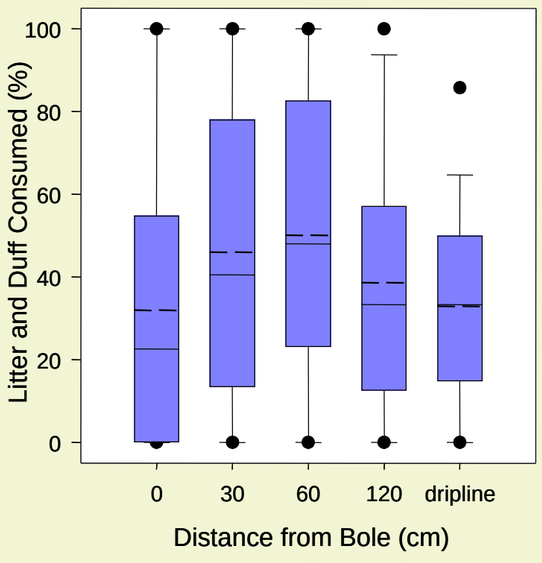
Average time to rake away one duff mound was 6.3 minutes for a crew of 2-3. Areas with shrubs took 8.0 minutes. Areas without shrubs, 5.6 minutes.


Duff pins showing consumption around unraked tree


Burning around a raked tree

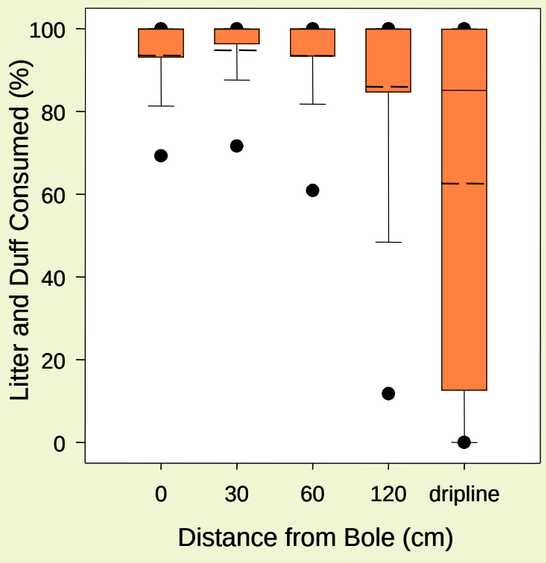


Spring Burn
Lassen Volcanic National Park



Average Duff Moisture in Duff Mound = **101%**

Fall Burn
Lassen National Forest



Average Duff Moisture in Duff Mound = **24%**

Number of Dead Cambium Samples
(Sampled cambium at groundline on 4 sides of each tree)

Site	Not Raked	Raked	p-value
Spring Burn	0.2	0.06	0.1674
Fall Burn	1.4	0.02	<0.0001

FUTURE PLANS:
~ Annually monitor for delayed tree mortality and bark beetle attacks