



# Assessing & Predicting Post-fire Conifer Mortality

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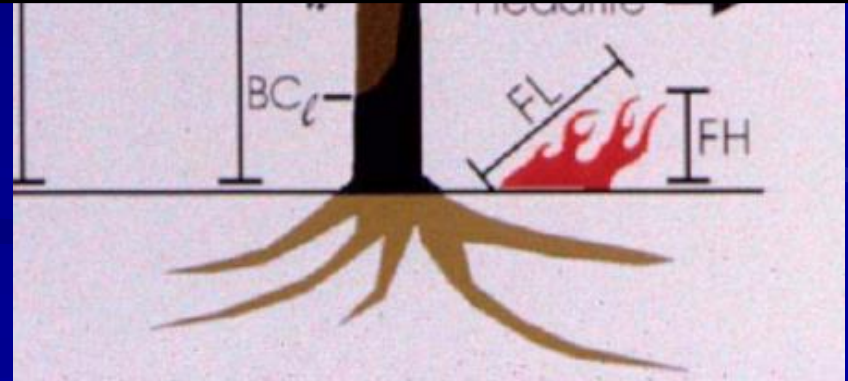


Extension Service

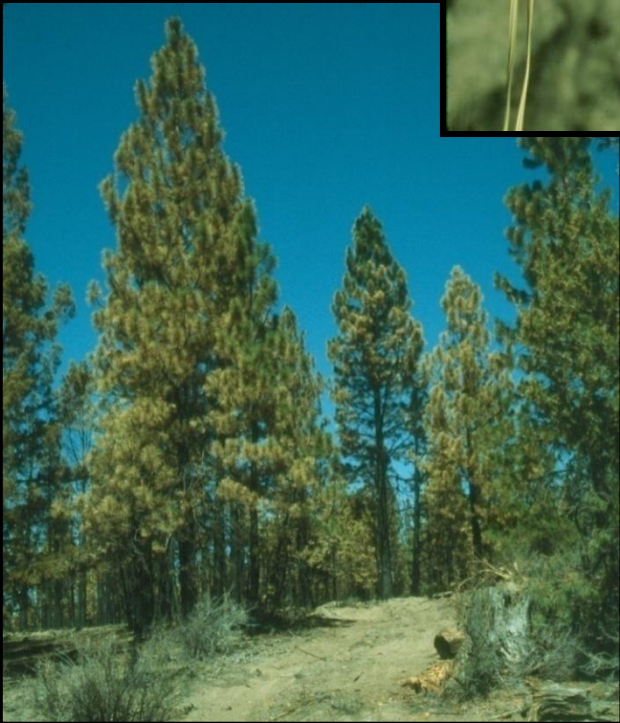
Workshop on Emerging Urban Forest Health Issues  
& BMPs to Improve Resilience  
Hood River, Oregon

# Wildfire Effects

- Vegetation & trees
  - Primary (heat)
  - Secondary (insects)
- Soils
- Stream & Watershed processes – water movement in and through the soil



# Assessing Tree Damage



# Fire Injury

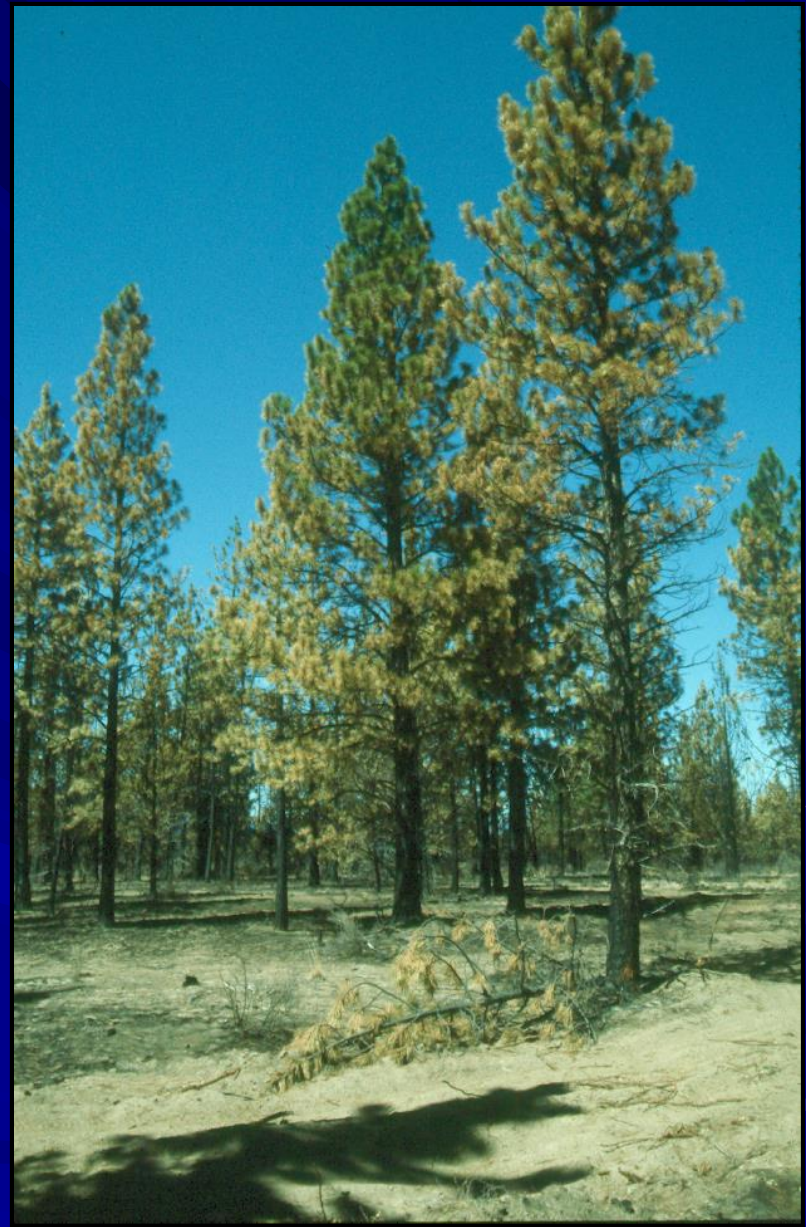
Heat injury to:

- Foliage & Buds
- Bole/trunk
- Roots



# Foliage/Buds

- Scorched/consumed
- Loss of photosynthetic ability.
- Can the tree survive with what remains?



# Bole/Trunk

- Species & Bark thickness
- Surface flame length (fuels & weather)
- Duration of heat
- Season of fire



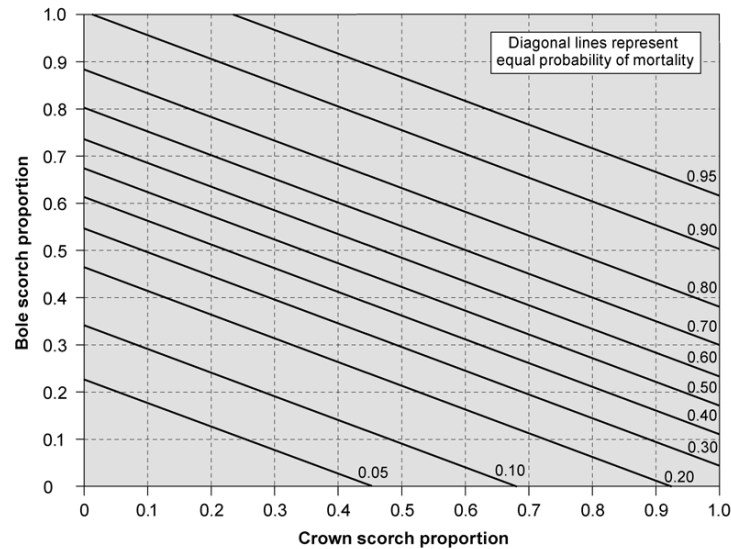
# Large/Old Growth Pine

- In the absence of fire, bark accumulations at the base of big old trees become their “Achilles’ heal” when prescribed or wildfire moves through a stand.
- Trees may survive a year to two on stored carbohydrate reserves.



# Field Guide for Determining Probability of Mortality — Ponderosa Pine

Mortality probability calculator for ponderosa pine developed using the Malheur model



To use the calculator, measure the bole and crown scorch proportions as described below for the ponderosa pine of interest. Find the corresponding bole scorch proportion on the left vertical axis (y-axis), then move horizontally to the right and locate the corresponding crown scorch proportion. Interpret the probability of mortality from the diagonal lines of equal mortality probability. As an example, assume a pine with 0.40 bole scorch proportion and 0.80 crown scorch proportion. The corresponding probability of mortality is 0.70.

### To estimate proportions:

1. Fold along double line and align the edge of the paper parallel to the bole of the subject tree.
2. **Bole scorch:** Orient yourself and the paper until the bottom and top of the subject tree align with the 0 and 1.0 lines, respectively, of the proportion gauge. Read to the nearest 0.025; for example, 0.300, 0.325, 0.350, 0.375.
3. Note the number on the proportion gauge corresponding to the highest bole scorch.
4. **Crown scorch:** Orient the paper until the bottom and top of the subject tree crown align with the 0 and 1.0 lines, respectively, of the proportion gauge. Note the number on the proportion gauge corresponding to the highest level of crown scorch at the bole. Crown scorch is seldom a horizontal line and is judged at the bole to be the mean between where at least half the needles on a branch are scorched and a branch where all the needles are green.
5. Determine the probability of mortality from the chart above. Examples: assume the management-designated cutoff for probability of mortality is 0.6. Example 1: proportion of bole scorch is 0.3; proportion of crown scorch is 0.5. Enter the chart at 0.3 for bole and 0.5 for crown and note from the diagonal lines that the probability of mortality is slightly more than 0.3. If the designated cutoff is 0.6, the example tree would be scored as likely to live. Example 2: proportion of bole scorch is 0.6; proportion of crown scorch is 0.6. From the chart the probability of mortality is approximately 0.82 if the designated cutoff is 0.6, tree would be scored as likely to die. The chart shows probability of mortality of individual trees given the proportion of bole and crown scorch.

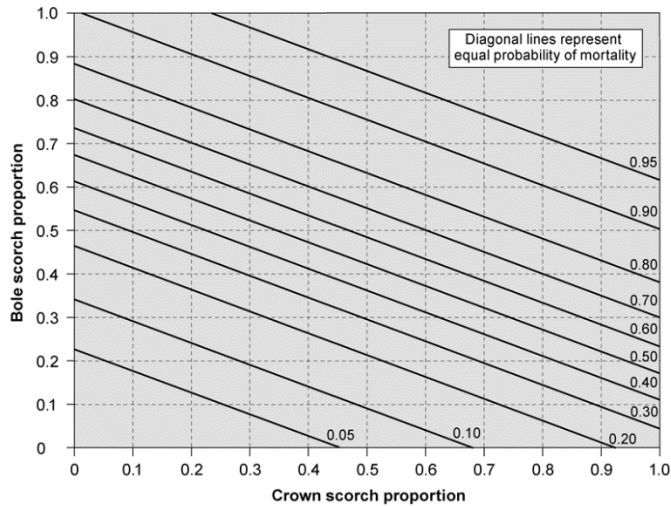
Note: individuals who are red/green color blind may have difficulty determining the height of crown scorch.





## Field Guide for Determining Probability of Mortality — Ponderosa Pine

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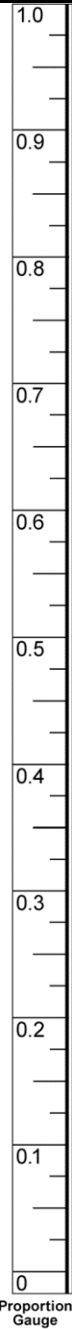


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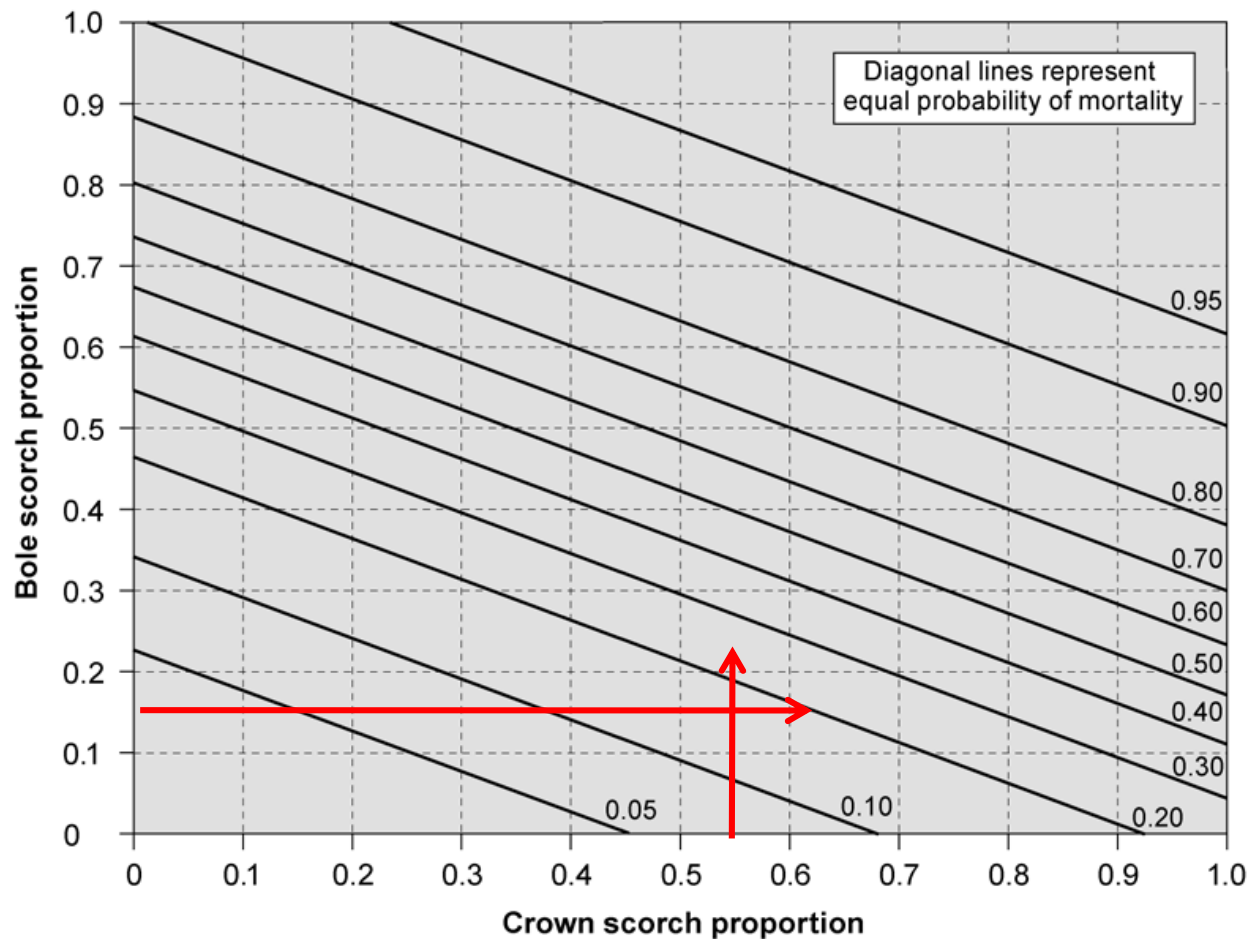
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Proportion Gauge



Mortality probability calculator for ponderosa pine developed using the Malheur model



**Based on crown and bole scorch, this tree has a 15-20% probability of mortality.**

# Fire Injury

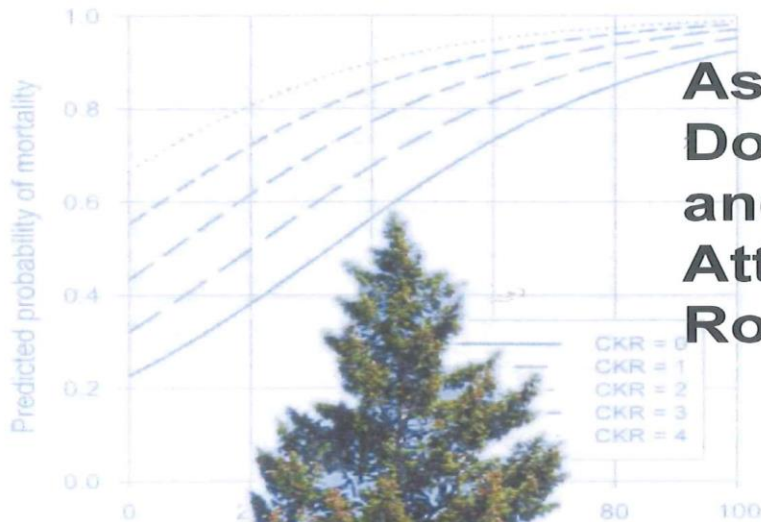
- What is the likelihood of these trees surviving?



CRIMINAL CONSPIRACY (FEET)

SURVIVAL PROBABILITY (PERCENT)

Unattacked



# Assessing Post-fire Douglas-fir Mortality and Douglas-fir Beetle Attacks in the Northern Rocky Mountains

Sharon Hood  
 Barbara Bentz  
 Ken Gibson  
 Kevin Ryan  
 Gregg DeNitto



United States  
 Department of  
 Agriculture

Forest Service

Rocky Mountain  
 Research Station

General Technical Report  
 RMRS-GTR-199

September 2007



# Other factors to consider

- Extended droughts
- Woody debris at the base of trees/root damage.
- Bark beetle populations in the area
- Pre-fire tree vigor & health



# Oregon Forest Practice Regulations



# To Salvage or Not to Salvage?

- Do you have enough volume to harvest?
- What are the current delivered log prices?
- What are the logging costs & road conditions?
- Can you salvage quickly before trees lose significant value through defect/decay?
- Is a logger available?
- Will you need to reforest after salvage cutting?

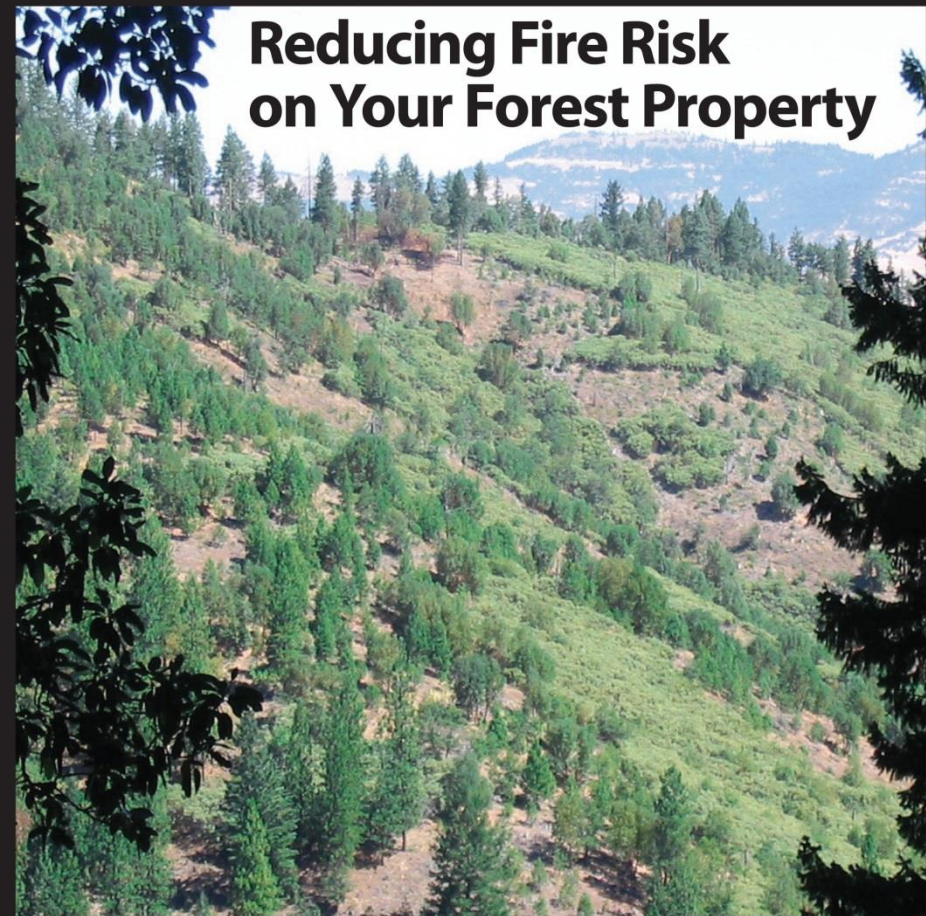


# Creating Fire-Resistant Forests





**For more info:**



A Pacific Northwest Extension Publication  
Oregon State University • University of Idaho • Washington State University  
PNW 618 • October 2010

<http://ir.library.oregonstate.edu/xmlui/handle/1957/19402>

# Summary

- Damage to the foliage/buds and to the bole are important factors in determining tree survival.
- Other factors include, woody debris loading around trees, insect activity in the general area, drought, and other factors.

