

**TITLE:** Monitoring Survival of Fire-injured Trees in Oregon and Washington

**LOCATION:** Throughout Oregon and Washington

**DURATION:** Year 2 of 3-year project

**FUNDING SOURCE:** Fire Plan

**PROJECT LEADER:** Robert Progar, Pacific Northwest Research Station, USDA Forest Service, 541.750.7374, rprogar@fs.fed.us

**COOPERATORS:** Don Scott, Craig Schmitt, Lia Spiegel, Bruce Hostetler, Beth Willhite, Andy Eglitis, Kristen Chadwick, Connie Mehmel, Don Goheen (R6 Forest Health Protection), Steve Acker, U.S. National Park Service, Olympic National Park, Lisa Ganio, Oregon State University, College of Forestry Statistician

**FHP SPONSOR/CONTACT:** Donald W. Scott, R6-FHP; La Grande, OR; 541-962-6545; dwscott@fs.fed.us

**PROJECT OBJECTIVES:** To test and refine the “Scott Guidelines” within the Blue and Wallowa Mountains and to calibrate those guidelines for other areas in the Pacific Northwest Region. These guidelines (Scott et al. 2002, “Factors affecting the survival of fire injured trees: a rating system for determining relative probability of survival of conifers in the Blue and Wallowa Mountains”; BMPMSC-03-01, as amended 87 p.) categorize the survival probability for trees injured by fire. Although the initial guidelines have been widely adopted, they should be tested against independent data for the Blue and Wallowa Mountains (and refined where appropriate), and calibrated for other tree species and habitats in the Pacific Northwest Region.

**JUSTIFICATION:** This project addresses two National Fire Plan key points: “rehabilitation” (knowing which trees will survive allows managers to better assess post-fire rehabilitation needs) and “hazardous fuels reduction” (knowing which trees are most likely to harbor bark beetles allows managers to design treatments aimed at limiting post-fire beetle outbreaks and the associated increase in hazardous fuels). Better information about the survival of fire-injured trees improves our estimates of the ecological impacts of specific fires, and provides a more accurate basis for planned restoration of fire-damaged ecosystems.

FHM aerial surveys can readily identify trees killed immediately by fire, but do not predict the subsequent delayed mortality of nearby injured trees. Knowledge of the extent of total (initial + delayed) tree mortality would help resource managers design rehabilitation plans that address both ecological and economic needs. Following the extensive fires in recent years, the initial Scott guidelines have been subject to intense scrutiny, and have been cited in several lawsuits, leading to high political visibility; this project will improve the scientific basis and credibility of those guidelines. New or improved guidelines will be produced for all major Pacific Northwest tree species, and will cover forested lands throughout Oregon and Washington. This project leverages plots that have been established in each of the past four years, shortening the time that would otherwise be required to obtain results. This project also responds to the additional emphasis within the national FHM program on conducting well-documented ground surveys that augment aerial survey observations, as featured in a Focus Group at the 2007 FHM Work Group Meeting.

**DESCRIPTION:**

**a. Background:**

Survival of fire-injured trees is affected by fire conditions, site and stand conditions, and individual tree characteristics. Because these factors can not be detected during aerial surveys, ground surveys are needed to refine the aerial survey observations by accounting for delayed

mortality of fire-injured trees. This project develops statistical models for using ground surveys to predict the survival of fire-injured trees.

For the past 4 years, many fire-injured trees throughout Oregon and Washington have been tagged and examined annually; causes of mortality or additional injuries are noted, with particular attention paid to bark beetles with potential for increased populations following a fire. This previous work has been done in cooperation with the National Park Service, the National Forest System, PNW Research Station, and Forest Health Protection; although the USFS has contributed over \$340,000 from non-FHM funds, little or no future funding is anticipated. The new FHM project will finish data collection (leveraging the 4 years of data already collected) and complete the data analyses. Predictive statistical models will be developed that categorize the probability of tree survival as low, moderate, or high based on individual tree data as well as site, stand, and fire conditions. This project complements similar projects in other western states.

#### **b. Methods**

Study plots have already been established on 22 wild and prescribed fires in Oregon and Washington from 2004 through 2007. Individual trees from these fires were selected to represent the range of species, dbh, and fire severity. Data were collected on site, tree, and fire severity characteristics to establish the association between fire and tree survival. All plots have been mapped using Trimble GPS units for future location. For 5 years following the plot establishment, each individual tree is examined annually. If tree death occurred during the preceding year, then cause of death will be determined and recorded; bark beetle activity is also noted. About 12,000 trees are currently being monitored annually.

All data collected through 2006 has been entered into a spreadsheet and checked for accuracy. This project would fund the entry of 2007 data, the annual monitoring and data entry for established plots in 2008-10, and data analyses to develop statistical models to predict tree survival categories. Data analyses and model development will be done in cooperation with Lisa Ganio, statistician at Oregon State University's College of Forestry.

#### **c. Products:**

The major product will be published guidelines for predicting the survival of fire-injured trees in Oregon and Washington. A project poster will also be produced annually and shared at the FHM Work Group meetings. The ground survey data (with GPS-located plots and individually tagged trees) will be available for review and use by other specialists.

#### **d. Schedule of Activities:**

winter 2007-spring 2008: enter 2007 data and check for accuracy

summer-fall 2008: monitor established plots, begin data analyses

Working with Oregon State University statistician Lisa Ganio we will refine and develop new models for tree survival in Region 6.

winter 2008-spring 2009: enter 2008 data and check for accuracy

data analyses & model development

summer-fall 2009: monitor established plots, continue model development

winter 2009-spring 2010: enter 2009 data and check for accuracy

model testing and revision

summer-fall 2010: monitor established plots, enter/check 2010 data

draft documentation of guidelines & underlying models

**e. Progress/Accomplishments:** See last page.

**COSTS:**

	Item	Requested FHM EM Funding	Other-Source Funding	Source
<b>YEAR 2008</b>				
<b>Administration</b>	Salary	\$33,014	\$32,000	PNW-Res, OSU
	Overhead (11%)	\$4,731		
	Travel	\$10,000		
<b>Procurements</b>	Contracting			
	Equipment			
	Supplies	\$500		
<b>Total</b>		\$48,245*	\$32,000	

	Item	Requested FHM EM Funding	Other-Source Funding	Source
<b>YEAR 2009</b>				
<b>Administration</b>	Salary	\$37,673	\$32,000	PNW-Res, OSU
	Overhead (11%)	\$4,992		
	Travel	\$7,070		
<b>Procurements</b>	Contracting			
	Equipment			
	Supplies	\$500		
<b>Total</b>		\$50,165	\$32,000	

\*FY08 EM funding lost to Fire Transfer: \$13,130.  
**Actual TOTAL FY09 Funds Requested: \$63,295.**

	Item	Requested FHM EM Funding	Other-Source Funding	Source
<b>YEAR 2010</b>				
<b>Administration</b>	Salary	\$39,267	\$32,000	PNW-Res, OSU
	Overhead (11%)	\$4,880		
	Travel	\$5,100		
<b>Procurements</b>	Contracting			
	Equipment			
	Supplies	\$500		
<b>Total</b>		\$49,747	\$32,000	

**Budget Notes:**

2008 = 10 field seasonal payperiods + 3 data entry seasonal payperiods + .25 FTE anal. tech.  
 2009 = 7 field seasonal payperiods + 3 data entry seasonal payperiods + .42 FTE anal. tech.  
 2010 = 5 field seasonal payperiods + 3 data entry seasonal payperiods + .50 FTE anal. tech.  
 other funding sources = PNW Research (R.Progar, 12 weeks per year) + Oregon State University (L.Ganio, 4 weeks per year)

## FY2008 Progress report

Our Forest Health Monitoring Project is on schedule and we anticipate completing our project within the time allocated.

During the previous 5 years we have established individual tree monitoring plots on 25 wild and prescribed fires in Oregon and Washington. We are developing, refining or rewriting the Scott Guidelines, a system for assessing survival of fire injured trees in Oregon and Washington.

In 2007-2008 all tree mortality data was entered and checked from the 2007 field season. Two seasonal personnel were hired for the 2008 field season. By September 31, 2008, 12,000 individual trees (16 species) from twenty-five wild and prescribed fires in Oregon and Washington (Figure 1) will have been monitored and data on disease and insect activity collected from each tree. This data will be entered into the data base and checked for accuracy.

Figure 1. Identification and distribution of wild and prescribed fires in our fire survival study.



2008 is the fifth and final year for monitoring approximately 1/3 of our trees. All fires that occurred on 2003 or earlier will no longer be monitored. We will initiate model development with OSU College of Forestry statistician, Lisa Ganio. This will be an intensive process of data compilation and analyses. Our data set is the largest fire survival data set and will be used to refine and develop the Scott Guidelines, the currently accepted method to evaluate survival of fire injured trees in Region 6.

Note: During August 2008 FIRE TRANSFER, \$13,130 was transferred from our study funds to support the National fire fighting effort. Restoration of these funds is necessary to meet salary commitments. Thank you.