

## Special Technology Development Program Progress Report

Complete a copy of this form for: 1) each multi-year project active in the current fiscal year and not requesting funds, and 2) each project requesting funds to extend into the following fiscal year. Add lines within the form as necessary. Delete all that does not apply.

**PROJECT NUMBER: R2-2001-01**

**PROJECT TITLE: The role of wildland fire and subsequent insect attack on ponderosa pine mortality**

**PROJECT STATUS: Continuing**

**EXPECTED PROJECT DURATION (total years for project): 3**

**ORIGINAL EXPECTED COMPLETION DATE OF THE PROJECT (fiscal year): 2004**

**EXPECTED COMPLETION DATE OF THE PROJECT (fiscal year): 2004**

**SUBJECT (from original application form): SUBJECT: (mark all that apply using 1 for primary category and 2 for secondary categories):** Biological Control\_\_\_ Invasive Species\_\_\_ Methyl Bromide Alternatives\_\_\_ Models 1 Monitoring 1 Organism Biology\_\_\_ Pesticides: Microbial\_\_\_ Pesticides: Synthetic\_\_\_ PTIPS\_\_\_ Population\_\_\_ Risk and Hazard 2 Remote Sensing\_\_\_ Semiochemicals\_\_\_ Silvicultural Technology 2 Social Values 2 Spray Technology\_\_\_

**STATUS OF SUBJECT SPECIES:** native

**PROJECT OBJECTIVES (from original application form):**

1. Quantify cumulative impacts of insects and fire on post-fire recovery of ponderosa pine ecosystems.
2. Determine tree mortality across burned areas 1, 2, and 3 years post-fire.
3. Provide a system for determining which trees will die based on percent crown scorch, scorch height on the bole and percent of basal circumference scorch.
4. Develop a probability model for risk rating trees likely to be infested with insects based on percent scorch.
5. Develop a visual guideline for forest land managers to evaluate potential tree mortality.
6. Quantify the movement of insects from fire-damaged trees to uninjured trees.

**BRIEF DESCRIPTION OF THE PROJECT:**

This project will help to define the impact caused by insects when interacting with another disturbance agent, wildfire. This will allow FHP to more accurately assist land managers in predicting potential tree mortality in post-fire situations. Currently, there is little information regarding fire/insect impact in ponderosa pine ecosystems across its range in the western United States. For example, written or visual guidelines are lacking for field personnel to determine what tree will live or die relative to the amount of damage caused by fire or the probability of injured trees being killed by insects. Furthermore, the probability of fire-damaged trees providing the source of an insect outbreak that subsequently spreads to uninjured trees remains unknown. The proposed project will address this lack of adequate information by formulating models and creating visual guides and, therefore, permit land managers to make more informed decisions regarding salvaging and insect control. This information also will be useful in the development of prescriptions for prescribed burning.

➤ **Year 1 (FY 2001)**

• **Summary**

1. During January through May, the investigators and cooperators met by phone and in the field to standardize procedures, work out kinks in methodology, and train field personnel.
2. Beginning in June, multiple ½ acre transects were installed on five national forests across 4 states (Black Hills National Forest in South Dakota, Custer NF in Montana, Arapaho-Roosevelt NF in Colorado, Kaibab & Coconino NF's in Arizona). Approximately 1,500 ponderosa pine trees were assessed at each site for fire damage and insect presence across varying fire intensities. In addition to quantifying the amount of damage to the crown and bole of trees and insect presence, trees were categorized by diameter, height, dwarf mistletoe infection (Arizona only) and fire-intensity rating of aboveground soil.
3. Approximately the same number of trees were assessed for status and insect presence in undamaged stands adjacent to the fire-impacted lands. These "green tree" transects will be used to monitor the potential movement of insects to and from fire areas and provide background estimates of tree mortality.
4. To determine the relationship between exterior fire damage and the damage to the cambium, 200+ additional trees per fires in Montana, South Dakota, and Arizona were assessed for scorch intensities and cambium health by removing 1-inch phloem plugs from the base of each tree on the four Cardinal directions. These same measurements will be conducted in Colorado in FY 2002.
5. The location of all transects (burned, green tree, and cambium health) were recorded using GPS units and are being entered into GIS layers for relational database analysis.
6. Data collected from fire, cambium health, and green tree transects are being entered.
7. Digital photographs were taken of representative trees by fire-damage categories and different insect symptoms and signs. These will be used to create visual guidelines for forest managers.
8. Aerial surveys also have been conducted over the areas of interest.

• **Preliminary findings**

1. Insect activity was considerable at the Black Hills NF, South Dakota, and Kaibab & Coconino NF, Arizona, fire sites. Both primary (*Ips*, western pine beetle, turpentine beetle) and secondary (wood borers) insects were detected in fire-damaged trees.
2. Additional tree mortality caused by insects is being observed and quantified within the fire study areas.

➤ **Year 2 (FY 2002)**

- Re-evaluate transects and plots to determine additional mortality and causes of mortality.
- Monitor for movement of insects from fire-injured trees to uninjured trees.
- Data entry

➤ **Year 3 (FY2003)**

- Re-evaluate transects and plots to determine additional mortality and causes of mortality.
- Data analysis and model development

- Preparation of photographic guide book for land managers that predicts which trees are likely to die from wildland fire and those that are likely to die within 2 years from subsequent insect attack.
- Manuscript preparation & presentation of results to targeted audiences.

**Candidly describe what has worked and what hasn't worked in the project, and within reason provide explanations that might help others to understand the limitations of techniques, approaches, technologies, and practices used or tried in the project.**

The project has basically progressed according to the time plan despite adding supplementary measurements to the original proposal. Being a multi-region project, considerable coordination was required to get everyone headed in the same direction. A meeting between investigators and cooperators prior to the start of field measurements and again with the field crews facilitated the development of procedures and standardization of data collection. Ongoing management activities by national forests (salvaging, additional prescribed burning) and road access made it difficult to install plots in some desired locations.

**CHANGES TO ORIGINAL PROJECT SCOPE OR OBJECTIVES** (changes that need to be made to the original proposal and reasons for the changes):

Although the project scope and objectives did not change, some work in the Black Hills National Forest was completed in cooperation with Colorado State University and other personnel from the Rocky Mountain Research Station not previously listed. CSU and RMRS received monies from the Black Hills National Forest to conduct a variety of monitoring studies. Some of these studies had partial overlap with our proposed work. Therefore, we decided to share information with them and vice versa.

Rating of trees within the fire and within the green-tree plots for dwarf mistletoe infection was not considered in the original proposal. Adding the measurement to the Colorado and Arizona sites was decided after discussion with pathologists. Dwarf mistletoe on ponderosa pine is not found in South Dakota or southeastern Montana.

**ADDITIONS TO ORIGINAL PROJECT SCOPE OR OBJECTIVES** (describe additional accomplishments expected from the project):

In addition to adding dwarf mistletoe ratings, we also decided to compare ocular estimates of crown scorch with crown scorch measured using a laser hypsometer. This will allow more precise measurements of crown damage than have been used in past fire-tree damage-insect studies and may facilitate the development of more accurate models.

Additional plots are being installed in wildfires that took place in Arizona and South Dakota during the summer of 2001. These additional plots will add more depth to the study by including areas that currently have high populations of insects that may be attracted to fire-scorched ponderosa pine and by increasing sample size of the timing of the fire.

**FHP LEAD CONTACT** (FHP person submitting proposal):

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**Note:** Joel transferred from Region 2 to Region 3 in August 2001. Because the original proposal was submitted through Region 2 and Kurt Allen remains in Region 2, this Progress Report is being submitted through Region 2. However, Joel will remain the FHP lead contact and a PI. Funds for this project will continue to be administered through Region 2.

**FHP LEAD INVOLVEMENT****Role****Time Commitment**

Coordinator of investigators and cooperators, supervisor of north zone crew during the FY2001.

**PRINCIPAL INVESTIGATOR(S)** (add lines as necessary):

<b><u>Name</u></b>	<b><u>Affiliation (Office or Dept.)</u></b>	<b><u>Phone, E-mail, Fax</u></b>
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**PRINCIPAL INVESTIGATOR(S) INVOLVEMENT** (add lines as necessary):

<b><u>Name</u></b>	<b><u>Role</u></b>	<b><u>Time Commitment</u></b>
Joel	Field assistance and facilitator of work in Arizona	4 weeks per year
Kurt	Field assistance and facilitator of work in South Dakota & Montana	4 weeks per year
Carolyn	Field assistance and facilitator of work in Arizona	4 weeks per year
Jose	Supervisor of Colorado work & data management	6 weeks per year
Ken	Field assistance and facilitator of work in Montana	2 weeks per year
John	Field assistance and facilitator of work in Arizona	4 weeks per year

**COOPERATORS** (contributing to, but not leading, the project) (add lines as necessary):

<b><u>Name</u></b>	<b><u>Affiliation (Office or Dept.)</u></b>	<b><u>Phone, E-mail, Fax</u></b>
Linda Wadleigh	R-3, Fire Management	Phone: (520) 635-8351 E-mail: <a href="mailto:lwadleigh@fs.fed.us">lwadleigh@fs.fed.us</a> Fax: (520) 635-8208
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**COOPERATOR INVOLVEMENT** (add lines as necessary):

<b><u>Name</u></b>	<b><u>Role</u></b>	<b><u>Time Commitment</u></b>
Linda Wadleigh	Supervisor of work in Arizona	4 weeks per year
Black Hills NF/B. Cook	Study site location, GIS support, aerial photography, logistical support	2 weeks per year
Arapaho/Roosevelt NF	Study site location, GIS support, aerial photography, logistical support	2 weeks per year

Custer NF Study site location, GIS support, 2 weeks per year aerial photography, logistical support

Coconino & Kaibab NF Study site location, GIS support, 2 weeks per year aerial photography, logistical support

**PRODUCTS AND DUE DATES** (from original application form):

Guidelines for land managers in determining post-fire impacts caused by fire/insect interaction. Final guidelines will be completed by December of 2003.

**PUBLICATIONS** (how results will be reported):

Information will be published as technical reports and peer-reviewed journal articles.

**TECHNOLOGY TRANSFER** (How will products or methods be transferred to users, adapted to other uses, or sustained by continuing technology transfer?):

Technical reports and articles will be presented to land managers with details on field use and incorporation into NEPA planning documents.

Slide presentation to national forest staff, conferences, and other appropriate meetings.

**STATUS OF PRODUCTS/PRESENTATIONS:** (If products or presentations are not completed by the due date, explain why and indicate when the products will be completed. Indicate whether the Region/Area considers current progress on the project to be acceptable; if not, what corrective measures are planned?)

Because we are still in the data collection phase, we have not given any presentations or produced any guidelines to date. We are considering having a session at the 2002 Western Forest Insect Work Conference in Montana on status of fire-insect studies. In addition to our work, other studies have been initiated in the other western states that are asking similar questions. We have held discussions with these investigators and shared our methodology for addressing fire-tree damage-insect interactions.

**ACCOMPLISHMENTS TO DATE:**

**Products:** N/A

**Publications:** N/A

**Technology Transfer:** N/A. Concepts and methodology developed in the original proposal have been used by other Forest Service Research and FHP personnel to initiate similar projects in other forest types and regions.

**FIRST FISCAL YEAR FUNDED:** FY2001

**FUNDS OBLIGATED FROM BEGINNING OF PROJECT THROUGH CURRENT FISCAL YEAR:** (include both monetary and in-kind, excluding FHP base funding and salaries):

	Item	Requested Funding	Received Funding	Expended Funding
<b>PREVIOUS YEAR FY 20001</b>				
<b>Administration</b>	Salary	21,000	21,000	18,000
	Overhead			
	Travel	7,000	7,000	6,000
<b>Procurements</b>	Contracting			
	Equipment	2,000	2,000	2,000
	Supplies	2,000	2,000	2,000
<b>YEAR TOTALS</b>		32,000	32,000	28,000

**FUNDS NOT USED FROM PREVIOUS FISCAL YEAR** (If there are unused funds, what is the reason for not using them? How will the project continue without these funds?)

There was \$4,000.00 of STDP funds not used in FY2001. An additional \$4,000 from the RMRS and R3 Regional Office were used to supplement the salaries and travel of personnel for work related to this project. This \$4,000 was above and beyond the “other source funding” listed for FY2001 and not anticipated before the start of the FY2001 field season. It is uncertain whether these other funds will be available for FY2002. Therefore, we are requesting the originally proposed \$29,000 for FY2002 (see below).

<b>Fiscal Year</b>	<b>STDP Funding Allocated</b>	<b>Funds Obligated</b>	<b>Funds Unused</b>
<b>FY2001</b>	<b>32,000.00</b>	<b>28,000.00</b>	<b>4,000.00</b>

**DIFFERENCE BETWEEN ORIGINAL AND AMENDED REQUESTS AND JUSTIFICATION** (the difference between originally requested funds and funds needed based on changes in the budget or scope of the project. Be specific and clear about where the money will be used and by whom):

We are requesting that the \$4,000 not used in FY2001 to be used as carry-over for FY2002. This money will be used for salary and travel of seasonal crews in the fall of 2001 for additional work not originally proposed. Additional data is being collected from wildland fires that occurred in South Dakota and Arizona during the 2001 (see above discussion on project additions). These additional data will strengthen the project by increasing the sample size of fire season (early versus late season). Furthermore, observational data suggest that there is greater insect activity in the South Dakota fire area and that it is important to document this.

**EXPECTED BUDGET FOR NEXT FISCAL YEAR:** (include both monetary and in-kind, excluding FHP base funding and salaries) (extend table as needed):

<b>CURRENT YEAR FY 2002</b>	<b>Item</b>	<b>Requested Funding</b>	<b>Other Source Funding</b>	<b>Source</b>
<b>Administration</b>	Salary	20,000	12,000	RMRS, NF's, R3 RO
	Overhead			
	Travel	7,000	4,000	RMRS
<b>Procurements</b>	Contracting			
	Equipment	1,000		
	Supplies	1,000		
<b>YEAR TOTALS</b>		<b>29,000</b>	<b>16,000</b>	

**STDP FUNDING NEEDED:**

Total estimated additional future funding needed beyond the current fiscal year:

<b>FY 2003</b>		<b>Requested FHP STDP Funding</b>	<b>Other Source Funding</b>	<b>Source</b>
<b>Administration</b>	Salary	20,000	17,000	RMRS, NF's, R3 RO
	Overhead			
	Travel	7,000	4,000	
<b>Procurements</b>	Contracting			
	Equipment	1,000		
	Supplies	1,000		
<b>YEAR TOTALS</b>		29,000	21,000	
<b>PROJECT TOTALS</b>		90,000.00	53,000.00	