

Number: INT-EM-04-03

TITLE: Severity and extent of Douglas-fir beetle infestations in northern Wyoming

LOCATION: Region 2, northern Wyoming

DURATION: Year 1 of 2-year project **FUNDING SOURCE:** Base

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PROJECT OBJECTIVES:

1. Quantify the extent and severity of Douglas-fir beetle infestations at the stand level through a plot network on the Bighorn National Forest. For example, determine what percentage of the volume of Douglas-fir was killed by Douglas-fir beetle in these stands.
2. Describe in detail the forest conditions present in areas that have experienced high levels of mortality over the past few years. For example, resolve what tree species and density of each species are left in stands that were predominantly Douglas-fir.
3. Provide information to forest managers and planners in the northern Rocky Mountains on potential impacts of Douglas-fir beetle based on stand conditions examined. For example, prepare evaluation monitoring and technical reports on Douglas-fir beetle impacts.

JUSTIFICATION: Forest Health Monitoring (FHM) aerial and ground detection surveys have been conducted and have indicated an increasing Douglas-fir beetle epidemic in the Bighorn Mountains of northern Wyoming. In addition, Forest Health Management has completed a biological evaluation of beetle population dynamics beginning in 2003. Although this evaluation describes changes in beetle populations and provided rough estimates of the number of trees killed, they do not appraise stand conditions and characteristics before, during or after the outbreak occurred.

During the Douglas-fir beetle outbreak in this area so far, surveys estimate that up to half of the Douglas-fir timber has been killed in some areas, and the outbreak is still increasing. This outbreak obviously will have a tremendous impact on forest conditions and forest health in northern Wyoming. Furthermore, as the beetles have consumed much of the available host material in the initial areas, they are moving to surrounding areas. However, we are lacking precise measurements of the impact that these beetles can have on pure and mixed stands of Douglas-fir following this type of large-scale outbreak. For example, the level of tree cover, tree species, and size classes of residual trees needs to be determined in areas that consisted predominantly of Douglas-fir before the outbreak occurred. Answers to these critical issues would not only be of value to managers in the Bighorn National Forest, but also should be applicable to other areas of the northern Rockies where there are extensive stands of Douglas-fir. Moreover, this

study could help address questions concerning what will happen should there be outbreaks of Douglas-fir beetle in similar stands in the central Rocky Mountains; thereby, providing a linkage with the region-wide Forest Health Monitoring program.

DESCRIPTION:

a. Background: The Douglas-fir beetle (*Dendroctonus pseudotsugae*) infests and kills Douglas-fir throughout its range in the west. Typically, the beetle reproduces in scattered trees that are highly stressed, such as windfall or fire-scorched trees. If enough suitable host is present, beetles can build up in these trees and move to infest nearby green trees. Douglas-fir stands on the Shoshone National Forest, WY occur in pure stands or can be associated with ponderosa pine, Engelmann spruce, subalpine fir, and lodgepole pine. In the Bighorns, extensive, pure stands are common. Douglas-fir occupies mainly lower elevation areas in the Bighorns that are important forested wintering areas for wildlife. These areas are also associated with recreation and scenic landscapes in the Bighorns. Landscape scale disturbances and loss of tree cover will have significant impacts on resource values in this area. There is no known cause, such as blowdown or fire that initiated this outbreak, however it has spread rapidly and is affecting most of the Douglas-fir stands in the Bighorns. Although damage caused by the Douglas-fir beetle has been extensive, the impact of this outbreak on relatively pure Douglas-fir stands is unknown. For example, we do not know the number of trees per acre killed, changes in stand structure, density, and species composition.

b. Methods: Measurement of forest conditions and Douglas-fir beetle severity will be conducted through plots laid out through stands that are predominantly Douglas-fir. The plots will cover areas both in the original outbreak and the new outbreak areas. Fixed radius plots will be installed in stands that have been impacted by Douglas-fir beetle and those that to this date are unaffected. A minimum of 50 plots will be installed for measurements of forest conditions and beetle impacts. Within each plot, FHM-type mensuration measurements will be taken on all in trees, including, but not limited to: tree species, diameter at breast height, and crown class and condition/damages. Within each plot, a 1/100th acre subplot (11.8 ft. radius) will be measured to determine the level of tree regeneration. Forest Health Monitoring microplot standards will be used on these subplots to determine the level of regeneration. Therefore, the proposed work will represent an intensification of the permanent plots being measured in the FHM program by providing finer resolution into a specific forest type and how its growth and structure has been impacted by biotic agents.

It is estimated that the collection of field data will take 2 months to complete. Included within this will be QA/QC checks done on 5-10% of the plots. Additional time will be required for data preparation and analysis.

c. Products: Products will include a technical report defining the extent and severity of the outbreak on the Douglas-fir resource. **Posters will be done to help with interpreting the causes and effects of the outbreak for the public. Data gathered from the project is being included in a report of current conditions to the forest. In September of 2004 a public meeting was held in Greybull, WY to discuss the current situation. Data gathered from field work on this project was used to address questions and concerns raised by the public. Also, data being gathered from the project is being used as supporting documentation for a proposed**

treatment in some affected areas.

d. Schedule of Activities:

Year 1: Summer of 2004. **A series of 25 infested and 25 uninfested plots were installed and measured in the summer of 2004. Data entry has started and will be completed over the winter of 04/05 and initial analysis will be done in the winter of 2004/spring of 2005. Also, in the summer of 2004, a set of aerial photos was taken over parts of the project area and will be used as an additional analysis tool. A poster with methods and preliminary findings will be done winter of 2004.**

Year 2: Summer 2005. Finish plot installation/field data collection. Revisit plots installed in 2004. Winter 2005/spring 2006 complete data analysis and prepare final reports.

e. Progress/Accomplishments:

Year 1 accomplishments include installation and data collection of the plots. Also, acquisition of aerial photos of part of the project area. Initial findings have are being put together and are being used by the Bighorn National Forest for project decision making. A progress report with initial findings will be completed. Year 2 will finish the field data collection and plot installation and a final report will be completed.

COSTS:

	Item	Requested FHM EM Funding	Other-Source Funding	Source
YEAR 1				
Administration	Salary	7500	16000	FHP
	Overhead			
	Travel	3000	3000	FHP
Procurements	Contracting			
	Equipment			
	Supplies	500	1000	FHP
Total		11,000	20,000	

	Item	Requested FHM EM Funding	Other-Source Funding	Source
YEAR 2				
Administration	Salary	7500	16000	FHP
	Overhead			
	Travel	3000	3000	FHP
Procurements	Contracting			
	Equipment			
	Supplies			
Total		10,500	19,000	

