

## Special Technology Development Program Progress Report

**PROJECT NUMBER:** R1-2001-03

**PROJECT TITLE:** Landscape level assessment of Douglas-fir beetle outbreaks and development of a monitoring system for predicting local population trends.

**PROJECT STATUS:** Continuing (funds are being requested for the next fiscal year to continue the project)

**EXPECTED PROJECT DURATION:** 3

**ORIGINAL EXPECTED COMPLETION DATE OF THE PROJECT:** FY 2003

**EXPECTED COMPLETION DATE OF THE PROJECT:** FY 2003

**SUBJECT:** 1 = models, monitoring, population, risk and hazard  
2 = organism biology

**STATUS OF SUBJECT SPECIES:** native

**PROJECT OBJECTIVES :** The primary objective of this study is to determine the spatial relationship among Douglas-fir beetle (DFB) infestations from year to year at the landscape level and how these infestations interact with stand conditions and hazard classifications. This information will be useful for a variety of purposes including refining existing hazard/risk rating systems, developing efficient ground-based sampling procedures, and designing mass-trapping and other management programs. In addition, we intend to develop a method for monitoring and forecasting current and future year Douglas-fir beetle population trends using pheromone-baited traps.

### **BRIEF DESCRIPTION OF THE PROJECT:**

We have made significant progress validating and testing the Douglas-fir beetle model developed by the USFS for use in the interior northwestern United States. The focus of the first year of funding was to gain a better understanding of the relationship between stand conditions and DFB infestations. The following outline details some of our accomplishments and plans for the current and subsequent years of this project.

#### **Year 2001-2002**

- Acquired spatial data with aerial survey information and stand hazard ratings for the Salmon Ranger District, Nez Perce National Forest, ID.
- Organized data into ArcView to allow further analysis of hazard model.
- Analyzed DFB infestations with regard to stand hazard ratings for the Salmon Ranger District.
- Determined that the hazard model is helpful for predicting DFB infestation given certain stand conditions.
  - Tree mortality increased from less than a 1000/year in 1996 & 1997 to over 6000 in 1999 (Figure 1). The number of infestations (Figure 2) and acres infested (Figure 3) followed similar trends.
  - Greater than 70% of trees killed occurred in moderate to high hazard stands in all years analyzed (Figs 4, 5, 6, and 7).
  - A trend of increased tree mortality in high hazard stands as DFB populations reached epidemic levels was seen. A similar trend was seen for the number of acres affected.
- Manuscript preparation is currently underway. By the end of 2001, a manuscript will be completed detailing the results of the validation of the DFB hazard model.

- Spatial analysis of population movements of DFB will begin in Oct-Nov. 2001 and continue into 2002.
  - Results will include potential and average dispersal distances
  - Interaction of stand hazard and DFB dispersal will be investigated
  - Risk classifications will be developed.

#### **Year 2002-2003**

- Intense spatial analysis, using wildlife dispersal models and spatial statistics, will be used to determine the maximum and minimum dispersal distances of DFB. This work will be continued from 2001.
- Fieldwork investigating the relationship between stand structure, host physiology, and subsequent DFB dispersal will be conducted in the spring and summer.
- A large scale trapping effort in several areas with different levels of DFB populations will begin during the early spring. Beetle catches will then be compared to local tree mortality estimates derived from aerial survey maps.

#### **Year 2003-2004**

- Mass trapping program will continue to allow for determination of DFB population trends and associated tree mortality.
- A method based on trapping experiments will be developed to predict the level of tree mortality expected locally, based on pheromone-baited catches of DFB.
- A final report will be completed.

**CHANGES TO ORIGINAL PROJECT SCOPE OR OBJECTIVES:** None

**ADDITIONS TO ORIGINAL PROJECT SCOPE OR OBJECTIVES:** None

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

<u>Name</u>	<u>Affiliation (Office or Dept.)</u>	<u>Phone, E-mail, Fax</u>
Carol Randall	Idaho Panhandle National Forest Coeur d'Alene, ID	208-765-7343, crandall@fs.fed.us Fax: 208-765-7307

**FHP LEAD INVOLVEMENT**

	<u>Role</u>	<u>Time Commitment</u>
Carol Randall	Project administration, technical advise	1-2 weeks/year

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

<u>Name</u>	<u>Affiliation (Office or Dept.)</u>	<u>Phone, E-mail, Fax</u>
Darrell W. Ross	Department of Forest Science Oregon State University Corvallis, OR 97331	541-737-6566 Darrell.ross@orst.edu Fax: 541-737-1393
Kevin J. Dodds	Department of Forest Science Oregon State University Corvallis, OR 97331	541-737-8509 Kevin.Dodds@orst.edu Fax: 541-737-1393
Gary E. Daterman	PNW Research Station Corvallis OR 97331	547-750-7365 gdaterman@fs.fed.us Fax: 541-758-7760

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

<u>Name</u>	<u>Role</u>	<u>Time Commitment</u>
Darrell W. Ross	Project administration, tech. advise	0.10
Gary E. Daterman	Technical advise`	0.05
Kevin J. Dodds	Data acquisition, analysis, reporting	0.50

**PRODUCTS AND DUE DATES:** Project reports will be prepared at the end of FY2001 and FY2002.

The final report including the validated hazard rating model and pheromone monitoring system will be prepared by the end of FY2003. A publication (s) reporting the results of this project will be submitted by January 2004.

**STATUS OF PRODUCTS/PRESENTATIONS:** Trapping to develop a model for predicting tree mortality based on trap catches will not begin until 2002 due to delay in transferring funds to OSU.

**ACCOMPLISHMENTS TO DATE:**

**Products:** Validation of the DFB hazard rating model.

**Publications:** One in preparation. Expected completion by November 2001.

**Technology Transfer:** None

**FIRST FISCAL YEAR FUNDED:** FY 2001

**FUNDS OBLIGATED FROM BEGINNING OF PROJECT THROUGH CURRENT FISCAL YEAR:**

	Item	Requested Funding	Received Funding	Expended Funding
<b>PREVIOUS YEAR FY 2001</b>				
<b>Administration</b>	Salary			
	Overhead			
	Travel			
<b>Procurements</b>	Contracting	42,462	42,462	42,462
	Equipment			
	Supplies			
<b>YEAR TOTALS</b>		42,462	42,462	42,462

<b>CURRENT YEAR FY 2002</b>				
<b>Administration</b>	Salary			
	Overhead			
	Travel			
<b>Procurements</b>	Contracting	47,029		
	Equipment			
	Supplies			
<b>YEAR TOTALS</b>		47,029		

FY 2003		Requested FHP STDP Funding	Other Source Funding	Source
<b>Administration</b>	Salary		13,494	OSU
	Overhead		13,675	OSU
	Travel			
<b>Procurements</b>	Contracting	48,216		
	Equipment			
	Supplies			
	Tuition		8745	OSU
<b>YEAR TOTALS</b>		48,216	35,914	
<b>PROJECT TOTALS</b>		137,709	102,647	

**FUNDS NOT USED FROM PREVIOUS FISCAL YEAR**

<b>Fiscal Year</b>	<b>STDP Funding Allocated</b>	<b>Funds Obligated</b>	<b>Funds Unused</b>
FY 2001	42,462	42,462	0

**EXPECTED BUDGET FOR NEXT FISCAL YEAR:**

	<b>Item</b>	<b>Requested FHP STDP Funding</b>	<b>Other-Source Funding</b>	<b>Source</b>
<b>Administration</b>	Salary		13,162	OSU
	Overhead		13,615	OSU
	Travel			
<b>Procurements</b>	Contracting	47,029		
	Equipment			
	Supplies			
	Tuition		8328	OSU
<b>Totals</b>		47,029	35,105	

**DIFFERENCE BETWEEN ORIGINAL AND AMENDED REQUESTS AND JUSTIFICATION:**

None

**STDP FUNDING NEEDED:**

<b>Fiscal Year</b>	<b>STDP Funding</b>	<b>Other-Source Funding</b>	<b>Source</b>
FY2002	47,029	35,105	OSU
FY2003	48,216	35,914	OSU

Figure 1. Total number of trees killed by DFB during the period 1996-1999

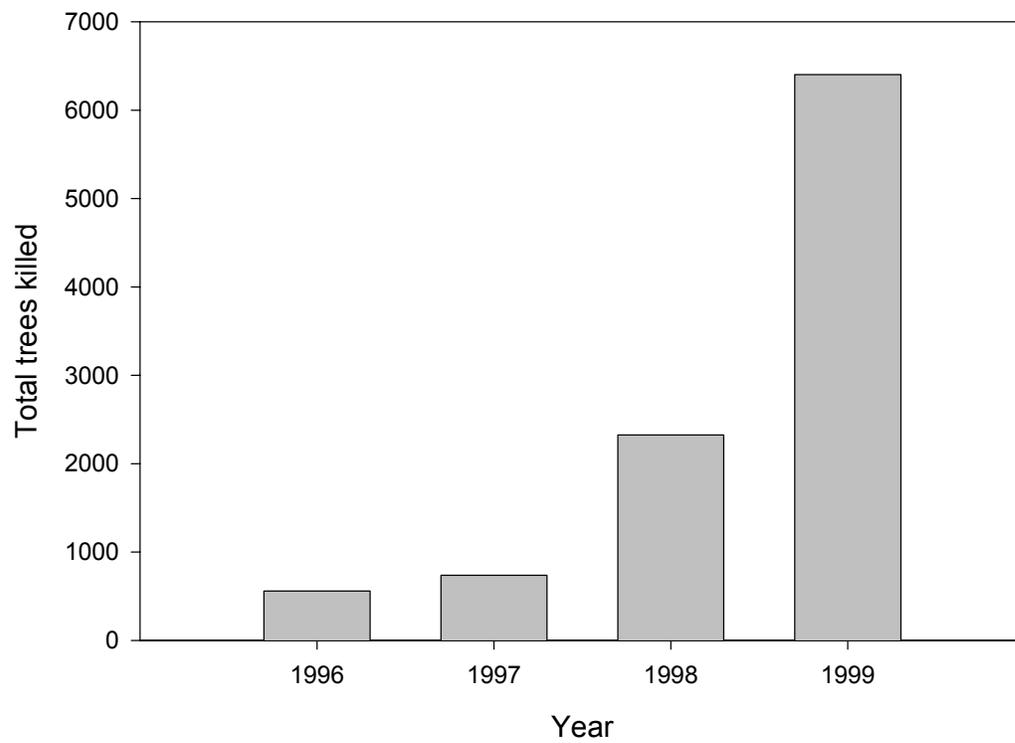


Figure 2. The number of infestations in the years 1996-1999.

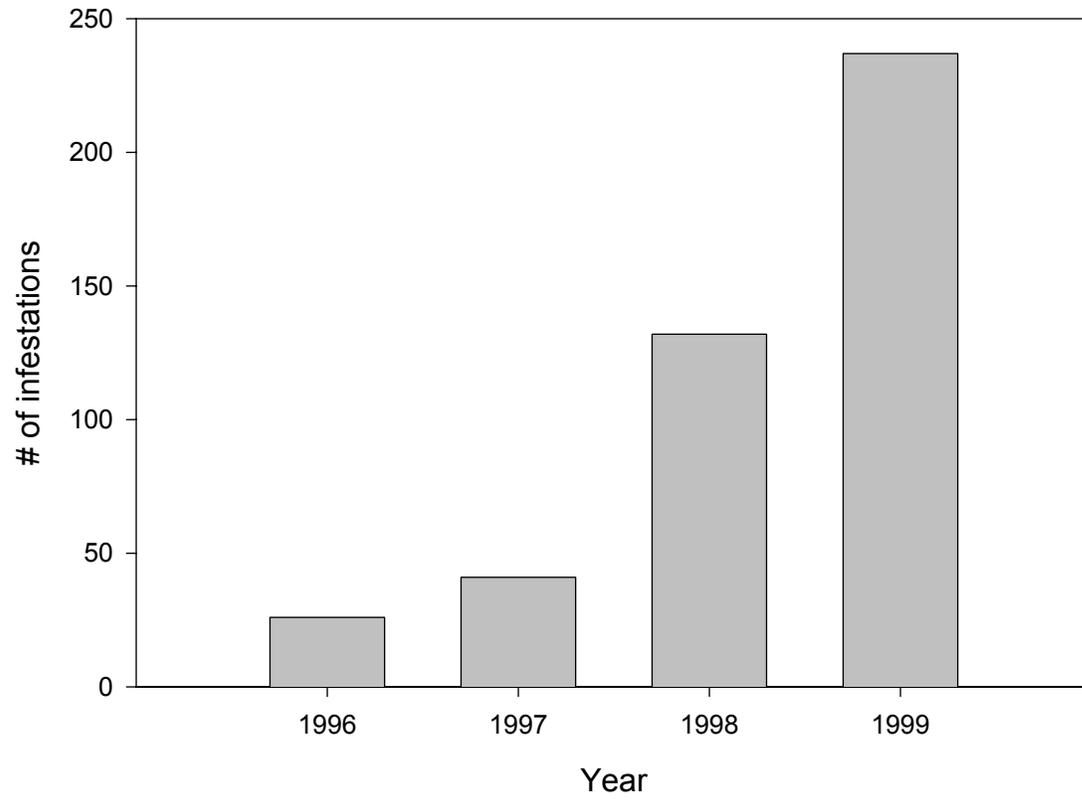


Figure 3. Total acreage influenced by DFB during the period 1996-1999

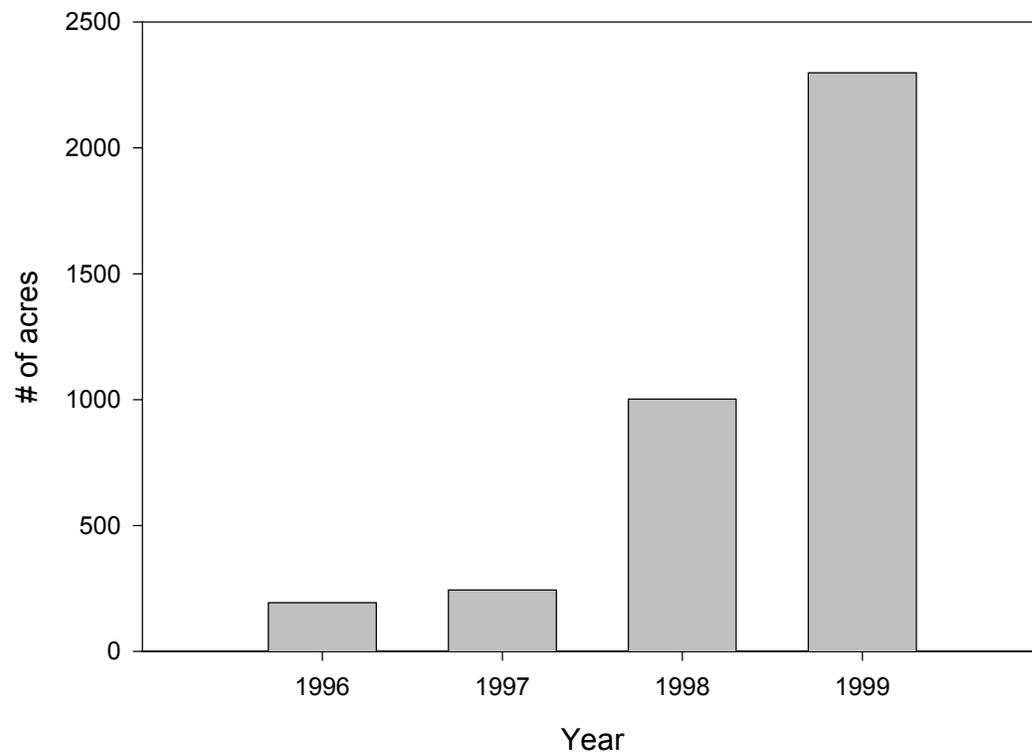


Figure 4. Standardized number of trees killed and acreage effected by DFB in 1996

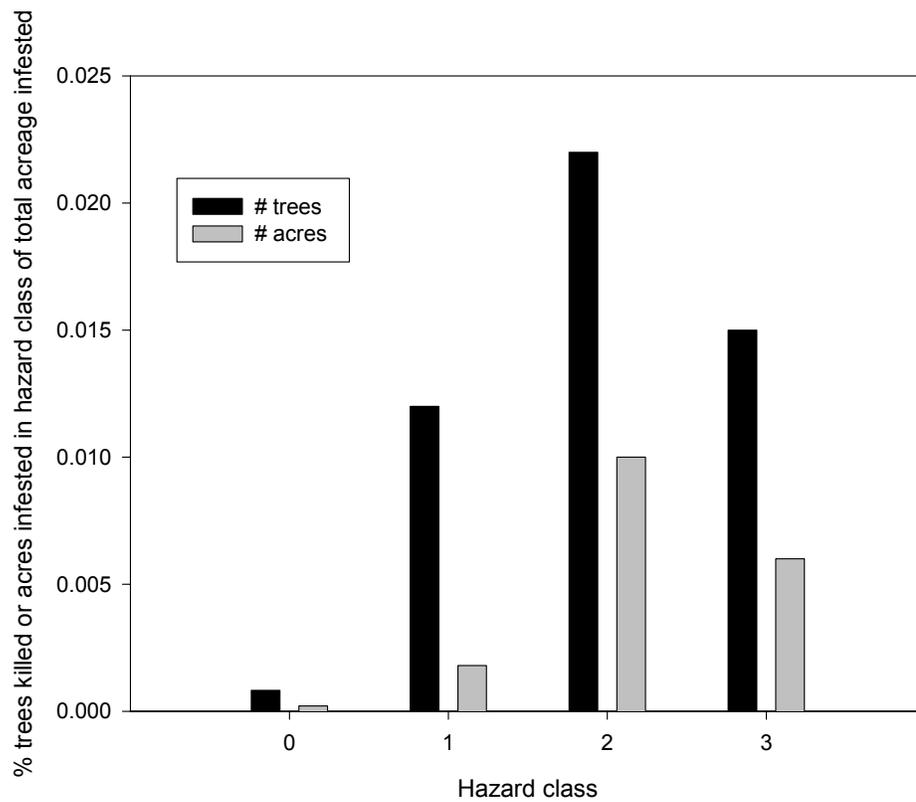


Figure 5. Standardized number of trees killed and acreage effected by DFB in 1997.

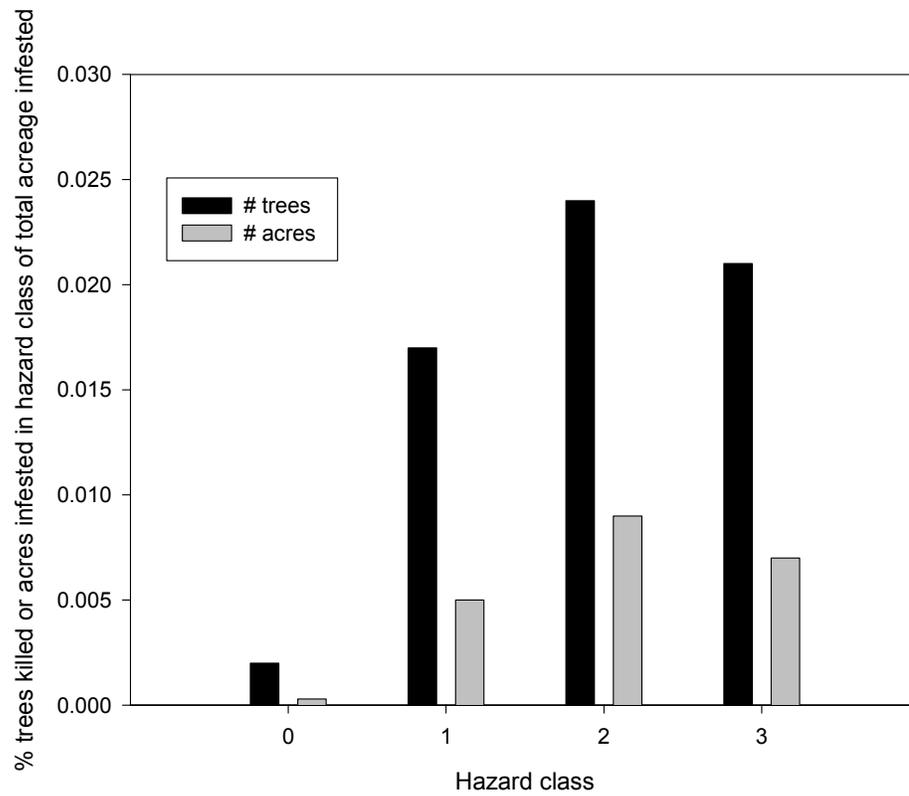


Figure 6. Standardized number of trees killed and acreage effected by DFB in 1998

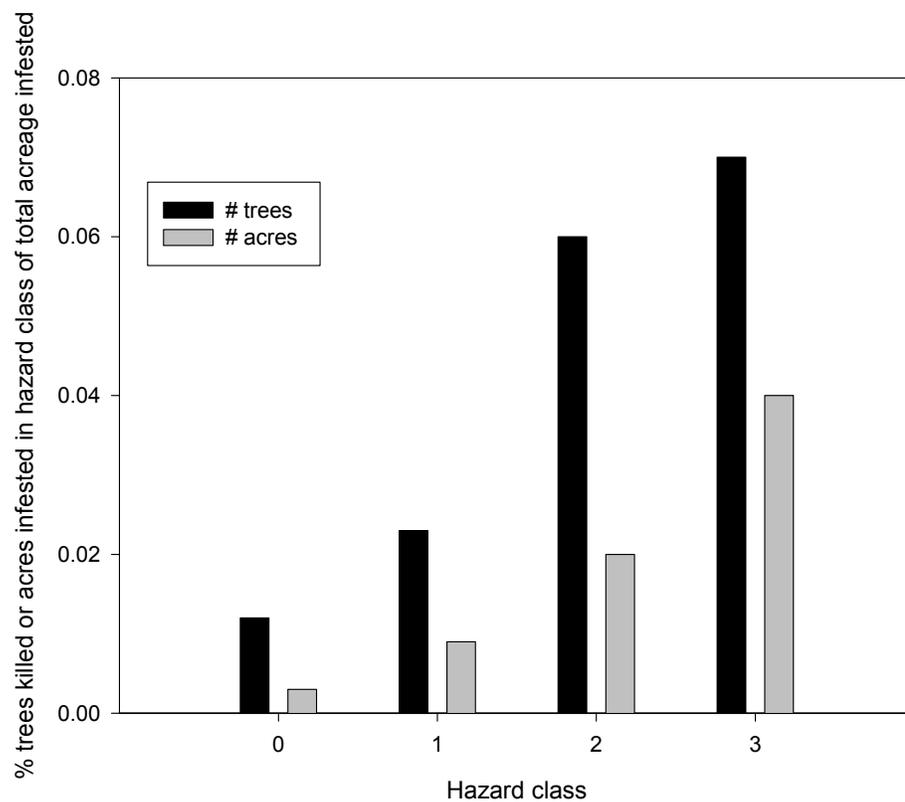


Figure 7. Standardized number of trees killed and acreage effected by DFB in 1999

