

## Special Technology Development Program Progress Report

**PROJECT NUMBER:** R6-1997-03

**PROJECT TITLE:** Testing pheromone-based methods for managing the Douglas-fir beetle at the landscape scale.

**PROJECT STATUS:** Continuing but without additional funds

**EXPECTED PROJECT DURATION:** 5 years

**ORIGINAL EXPECTED COMPLETION DATE OF THE PROJECT:** FY 1999

**EXPECTED COMPLETION DATE OF THE PROJECT:** FY 2002

**SUBJECT:** Bark beetles, Douglas-fir beetle (*Dendroctonus pseudotsugae* Hopkins)

**STATUS OF SUBJECT SPECIES:** native

**PROJECT OBJECTIVES:** The objective of this study is to determine if a combination of pheromone-based treatments can significantly reduce Douglas-fir beetle impacts on resource values at the landscape scale. A secondary objective is to compare the efficacy and selectivity of pheromone-baited trap-trees with pheromone-baited traps.

**BRIEF DESCRIPTION OF THE PROJECT:** This study was conducted in eastern Washington and northern Idaho using a paired plot design. Five replications were installed. Plots consisted of small landscape units of about 1,000 ha that were infested with Douglas-fir beetle. Paired plots were selected to be as similar as possible and relatively close to one another. One plot from each pair was randomly selected to receive pheromone treatments and the other served as an untreated control.

Both aggregation and antiaggregation pheromones were used to minimize beetle-caused tree mortality. Specific pheromone treatments were developed in consultation with the local land managers. High-value stands such as recreational or administrative sites, old-growth reserves, or riparian areas where managers wished to minimize tree mortality were treated with the antiaggregation pheromone, 3-methylcyclohex-2-en-1-one (MCH). Pheromone trap sites were selected in the general forest areas based on accessibility and minimum potential for tree mortality to negatively impact management objectives. Trap sites were chosen to cover the plots as uniformly as possible. Pheromone treatments were applied at each site for at least two consecutive years. Plots have been aerially surveyed each year to determine the amount and distribution of beetle-caused tree mortality on treated and control plots before treatment, each year during treatment, and one year after treatment. The final aerial surveys were conducted during the summer of 2000. The amount and distribution of tree mortality on treated and control plots and surrounding areas will be compared to assess treatment efficacy.

We installed 3 replications of the landscape level test in the spring of 1997. Two replications (Slate and Fenn) were on the Nez Perce National Forest in Central Idaho and the other (Wenatchee) was on the Wenatchee National Forest in central Washington. We installed 2 additional replications in the spring of 1998. One replication (Newport) was on the Colville National Forest in eastern Washington and the other (Priest Lake) was on the Panhandle National Forest in northern Idaho. The 1997 plots were all retreated in 1998. All 5 plots were retreated in 1999. All 5 study areas had Douglas-fir beetle populations that were attacking and killing live trees. The plots at Slate, Wenatchee, and Newport included MCH applications to protect wildlife habitat and recreational sites. Approximately 50 acres were treated with MCH on each of those

plots. There were no high-valued stands that justified MCH treatment on the Fenn or Priest Lake replications. Pheromone-baited traps were established on all 5 treated plots. We installed 31 traps at Slate, 27 at Fenn, 26 at Wenatchee, 31 at Newport, and 28 at Priest Lake. Traps were emptied and maintained at weekly intervals throughout the beetle flight period each year. Over 95% of the trap samples have been processed in the lab and the data are currently being entered and analyzed.

Aerial surveys of all plots were conducted in late summer of 1997, 1998, 1999, and 2000. The 1997 aerial surveys were pre-treatment data for the 3 plots that were installed that year. The 1998 aerial surveys represent pre-treatment conditions for the 2 replications added in 1998. That is, the infested trees identified in this survey were attacked and killed in 1997, prior to plot establishment. The 1998 surveys of the other 3 replications are the first data on the efficacy of the treatments applied in 1997. The 1999 aerial surveys represent first and second year results depending upon the year that the plot was installed. The 2000 aerial surveys are second and third year results for plots established in 1997 and 1998, respectively. The aerial survey data is currently being analyzed.

Remaining trap samples will be processed and all data will be analyzed and summarized for the landscape scale test by early in 2002.

In 1997, a study was installed near the landscape level plots at Slate to compare the efficacy of pheromone-baited trap-trees and traps. The results of that study demonstrated that traps caught significantly more beetles than trap-trees. More male beetles were caught in pheromone-baited traps than in trap trees, while significantly higher numbers of females were caught in the trap-trees.

**CHANGES TO ORIGINAL PROJECT SCOPE OR OBJECTIVES:** Only 3 replications were installed during the first year of the study instead of 4 as originally proposed because we were unable to locate more than 3 suitable areas before beetles began to emerge. Two additional replications were installed during the second year. As a result of this delay in plot installation, the study has been extended by a year over the original schedule. Only 3 of the 5 treated plots included MCH applications because the other 2 plots had no high-valued stands justifying MCH treatment. Also, due to the large size of plots, rugged terrain, and limited access, we decided to rely on aerial surveys rather than ground surveys to assess treatment efficacy on all plots. Finally, we decided to conduct the comparison of pheromone-baited traps and trap trees in separate areas rather than overlay that study on the landscape level test as originally proposed to prevent confounding the results of either project. None of these changes to the original study plan will prevent us from meeting the project objectives.

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

**FHP LEAD CONTACT:**

| <u>Name</u>     | <u>Affiliation (Office or Dept.)</u> | <u>Phone, E-mail, Fax</u>  |
|-----------------|--------------------------------------|--|
| Dave Bridgwater | R6 Natural Resources – FID           | 503-808-6222<br><a href="mailto:dbridgwater@fs.fed.us">dbridgwater@fs.fed.us</a> |

**FHP LEAD INVOLVEMENT**

| <u>Name</u>     | <u>Role</u>            | <u>Time Commitment</u> |
|-----------------|------------------------|------------------------|
| Dave Bridgwater | Project administration | 1 week/year            |

**PRINCIPAL INVESTIGATOR(S):**

| <u>Name</u>   | <u>Affiliation (Office or Dept.)</u>                    | <u>Phone, E-mail, Fax</u>  |
|---------------|---|--|
| Darrell Ross  | Department of Forest Science<br>Oregon State University | 541-737-6566<br><a href="mailto:darrell.ross@orst.edu">darrell.ross@orst.edu</a>             |
| Gary Daterman | PNW Research Station                                    | 541-737-1393<br>541-750-7365<br><a href="mailto:gdaterman@fs.fed.us">gdaterman@fs.fed.us</a> |

541-758-7760

**PRINCIPAL INVESTIGATOR(S) INVOLVEMENT:**

| <u>Name</u>   | <u>Role</u>  | <u>Time Commitment</u> |
|---------------|--|------------------------|
| Darrell Ross  | Project design, data acquisition, data analyses, and reporting | 4-8 weeks/year         |
| Gary Daterman | Project design, data acquisition, data analyses, and reporting | 2 weeks/year           |

**COOPERATORS:**

| <u>Name</u>     | <u>Affiliation (Office or Dept.)</u>                                 | <u>Phone, E-mail, Fax</u> |
|-----------------|--|---------------------------|
| Ken Gibson      | R1 Forest Health Protection<br>Missoula Field Office                 |                           |
| Paul Flanagan   | Forest Entomology and pathology<br>Wenatchee National Forest Science |                           |
| Paul Shielke    | Lake Wenatchee Ranger District<br>Wenatchee National Forest          |                           |
| Heather Berg    | Selway Ranger District<br>Nez Perce National Forest                  |                           |
| Jennifer Nelson | Salmon River Ranger District<br>Nez Perce National Forest            |                           |
| Lynn Kaney      | Newport Ranger District<br>Colville National Forest                  |                           |
| Larry Meyer     | Priest Lake Ranger District<br>Idaho Panhandle National Forests      |                           |
| Tim McConnell   | Region 1 Forest Health Protection<br>Missoula Field Office           |                           |
| Keith Sprengel  | Region 6 Forest Insects and Disease<br>Westside Technical Center     |                           |

**COOPERATOR INVOLVEMENT:**

| <u>Name</u>     | <u>Role</u>                   | <u>Time Commitment</u> |
|-----------------|-------------------------------|------------------------|
| Ken Gibson      | Plot location                 |                        |
| Paul Flanagan   | Plot location                 |                        |
| Paul Shielke    | Plot location and maintenance |                        |
| Heather Berg    | Plot location and maintenance |                        |
| Jennifer Nelson | Plot location and maintenance |                        |
| Lynn Kaney      | Plot location and maintenance |                        |
| Larry Meyer     | Plot location and maintenance |                        |
| Tim McConnell   | Aerial surveys                |                        |
| Keith Sprengel  | Aerial surveys                |                        |

All of the cooperators were involved for varying amounts of time during earlier phases of this project. At this time, they are no longer directly involved with the project.

**PRODUCTS AND DUE DATES:** This project will produce specific recommendations for the application of aggregation and antiaggregation pheromones to protect resources from the Douglas-fir beetle. In the original proposal we stated that the final recommendations would be available by the middle of 1999.

**STATUS OF PRODUCTS/PRESENTATIONS:** Because we were not able to install all of the plots in 1997 and processing of trap samples in the lab is taking longer than expected, the final results will not be available until early in 2002.

**ACCOMPLISHMENTS TO DATE:**

**Products:** Annual progress reports.

**Publications:**

Dodds, K.J., D.W. Ross, and G.E. Daterman. 2000. A comparison of traps and trap trees for capturing Douglas-fir beetle, *Dendroctonus pseudotsugae* (Coleoptera: Scolytidae). J. Entomol. Soc. Brit. Columbia 97:33-37.

**Technology Transfer:** Informal discussions with cooperators. No formal technology transfer will occur until the project is completed.

**FIRST FISCAL YEAR FUNDED:** FY 1997

**FUNDS OBLIGATED FROM BEGINNING OF PROJECT THROUGH CURRENT FISCAL YEAR** (extend table as needed)(Ignore this section if not requesting funds):

|                       | <b>Item</b> | <b>Requested Funding</b> | <b>Expended Funding</b> | <b>Unused Funding</b> |
|-----------------------|-------------|--------------------------|-------------------------|-----------------------|
| <b>FIRST YEAR</b>     |             |                          |                         |                       |
| <b>Administration</b> | Salary      |                          |                         |                       |
|                       | Overhead    |                          |                         |                       |
|                       | Travel      |                          |                         |                       |
| <b>Procurements</b>   | Contracting | 67,918                   | 67,918                  |                       |
|                       | Equipment   |                          |                         |                       |
|                       | Supplies    |                          |                         |                       |
| <b>Year Totals</b>    |             | 67,918                   | 67,918                  |                       |
| <b>SECOND YEAR</b>    |             |                          |                         |                       |
| <b>Administration</b> | Salary      |                          |                         |                       |
|                       | Overhead    |                          |                         |                       |
|                       | Travel      |                          |                         |                       |
| <b>Procurements</b>   | Contracting | 54,015                   | 54,015                  |                       |
|                       | Equipment   |                          |                         |                       |
|                       | Supplies    |                          |                         |                       |
| <b>Year Totals</b>    |             | 54,015                   | 54,015                  |                       |
| <b>THIRD YEAR</b>     |             |                          |                         |                       |
| <b>Administration</b> | Salary      |                          |                         |                       |
|                       | Overhead    |                          |                         |                       |
|                       | Travel      |                          |                         |                       |
| <b>Procurements</b>   | Contracting | 12,000                   | 12,000                  |                       |
|                       | Equipment   |                          |                         |                       |
|                       | Supplies    |                          |                         |                       |
| <b>Year Totals</b>    |             | 12,000                   | 12,000                  |                       |
| <b>Year Totals</b>    |             |                          |                         |                       |
| <b>PROJECT TOTALS</b> |             | 133,933                  | 133,933                 |                       |

**FUNDS NOT USED FROM PREVIOUS FISCAL YEAR**

| <b>Fiscal Year</b> | <b>STDP Funding Allocated</b> | <b>Funds Obligated</b> | <b>Funds Unused</b> |
|--------------------|-------------------------------|------------------------|---------------------|
|                    |                               |                        |                     |
|                    |                               |                        |                     |
|                    |                               |                        |                     |

**EXPECTED BUDGET FOR NEXT FISCAL YEAR (extend table as needed):**

|                       | <b>Item</b> | <b>Requested FHP STDP Funding</b> | <b>Other-Source Funding</b> | <b>Source</b> |
|-----------------------|-------------|-----------------------------------|-----------------------------|---------------|
| <b>Administration</b> | Salary      |                                   |                             |               |
|                       | Overhead    |                                   |                             |               |
|                       | Travel      |                                   |                             |               |
| <b>Procurements</b>   | Contracting |                                   |                             |               |
|                       | Equipment   |                                   |                             |               |
|                       | Supplies    |                                   |                             |               |
|                       |             |                                   |                             |               |
| <b>Totals</b>         |             | None                              |                             |               |

**DIFFERENCE BETWEEN ORIGINAL AND AMENDED REQUESTS AND JUSTIFICATION: 0**

**STDP FUNDING NEEDED: 0**

| <b>Fiscal Year</b> | <b>STDP Funding</b> | <b>Other-Source Funding</b> | <b>Source</b> |
|--------------------|---------------------|-----------------------------|---------------|
|                    |                     |                             |               |
|                    |                     |                             |               |
|                    |                     |                             |               |
|                    |                     |                             |               |