

# A SURVEY OF NORTHERN SPOTTED OWL NESTS IN DOUGLAS-FIR DWARF MISTLETOE BROOMS ON THE APPLGATE RANGER DISTRICT AND ASHLAND RESOURCE AREA OF SOUTHWEST OREGON

Katy Marshall, Southwest Oregon Forest Insect and Disease Service Center, Central Point, OR  
Mario Mamone, US Fish and Wildlife Service, Office of Technical Support, Portland, OR  
Rick Barclay, 2-B Forests, Applegate, OR

## Introduction

This survey was done to provide forest managers on the Applegate Ranger District, Rogue River National Forest and the Siskiyou Mountains portion of the Ashland Resource Area, Medford District, Bureau of Land Management with information about northern spotted owl nests in Douglas-fir dwarf mistletoe brooms.

In parts of southwest Oregon the northern spotted owl (*Strix occidentalis var caurina*) commonly nests in Douglas-fir dwarf mistletoe brooms. On the Applegate Ranger District of the Rogue River National Forest approximately 90 percent of the known spotted owl nests are in Douglas-fir dwarf mistletoe brooms. Local forest managers needed a better understanding of the owls' use of brooms to plan management of surrounding forests to ensure suitable nesting habitat and maintain vigorous stands at the same time.

In 1997 the Rogue River National Forest provided funds for a survey of spotted owl nest sites. The objectives of the survey were to collect information about Douglas-fir dwarf mistletoe infection around the nests, the dwarf mistletoe brooms and platforms in the brooms, and characteristics of the nests, the nest trees and the surrounding stands.

## Methods

We randomly selected 35 nest sites from a list of known spotted owl nests in Douglas-fir dwarf mistletoe brooms on the Applegate Ranger District of the Rogue River National Forest and on adjacent land in the Ashland Resource Area of the Medford District, Bureau of Land Management. At each site we defined the nest stand as the 20 acres of suitable habitat immediately surrounding the nest. We delineated the boundaries of these stands using aerial photographs.

Data were collected at several levels in each nest stand. At each of the 35 nest trees, we collected data on the nest tree, the nest broom and any other brooms in the nest tree. We then selected 11 of the nest stands for more intensive data collection. We located ten variable radius plots in a grid in each stand, including one plot around the nest tree. At each plot we tallied "in" trees by species and measured the diameter of all live Douglas-fir trees and the level of Douglas-fir dwarf mistletoe infection. We also collected information about site and stand conditions at each plot. We used Tinnin's modification of Hawksworth's six-class dwarf mistletoe rating system to quantify the Douglas-fir dwarf mistletoe infection (Tinnin 1998).

## Results

### Douglas-fir Dwarf Mistletoe Infection Levels

Broom Volume Ratings (BVR) of the nest trees ranged from one to six. The average BVR of the nest trees was 2.94. This indicates that on average just about half the nest trees' crowns were occupied by brooms. Sixty-eight percent of the other Douglas-fir trees in the nest plots were also infected. Broom Volume Index (BVI, the average BVR of infected Douglas-fir) of these trees was 2.68, indicating that on average one third to one half the crowns of the other Douglas-fir trees in the nest plots were occupied by brooms.

On average, the nest plots had more infection and more intense infection compared to the non-nest plots (Table 1). This was partly because 48 percent of the non-nest plots had no infection. However, nest plots had higher BVR and BVI values even when the comparison included only the non-nest plots that had infected trees. BVI of Douglas-fir trees in the non-nest plots was 1.80, indicating that on average less than one third of the crowns of infected Douglas-fir in the non-nest plots were occupied by brooms.

| Table 1.                                 | Average BVR | BVI  | Percent Douglas-fir trees infected |
|--|-------------|------|------------------------------------|
| Nest plots                               | 1.95        | 2.71 | 72                                 |
| All non-nest plots                       | 0.27        | 1.73 | 15                                 |
| Non-nest plots with infected Douglas-fir | 0.48        | 1.80 | 64                                 |

### Stands

In ten of the eleven stands at least 40 percent of the plots had some level of Douglas-fir dwarf mistletoe infection. There was great variation among the stands in the percentage of Douglas-fir trees infected. However, the overall average was 28 percent. In nine of the eleven stands the average BVI was less than three, indicating that in most of the stands the majority of infected trees had less than half their crowns occupied by brooms.

### Brooms

We characterized the brooms using a system developed by Tinnin and Knutson (1985). They classified Douglas-fir dwarf mistletoe brooms into three types based on their structure and point of origin on the host tree. Type 1 brooms originate out on branches. They are limited in size by their weight. Type 2 brooms originate within a few feet of the bole. The supporting limb is greatly thickened and often turns upward. Type 3 brooms originate on the bole, creating a dense profusion of branches.

Both Type 2 and 3 brooms can become very large. We found that the majority of nests were in Type 3 brooms, which were otherwise quite rare in the nest trees (Figure 1). Type 2 brooms had

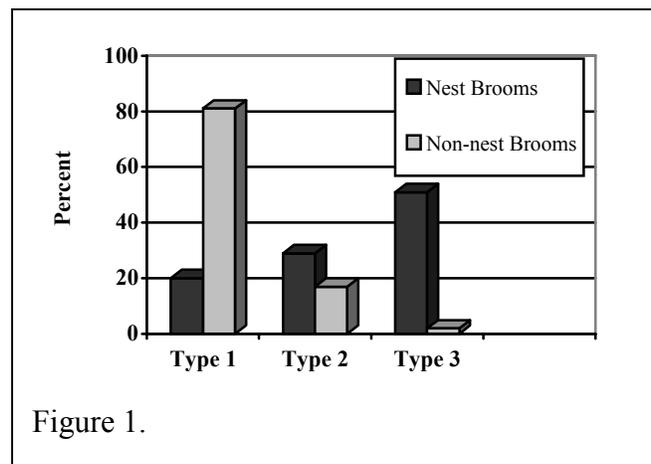


Figure 1.

the next highest rate of use and occurrence. Type 1 brooms contained the fewest nests even though they were by far the most common type of broom.

Fifty-seven percent of the nest brooms were in the lower third of the nest trees' crowns. Forty percent were in the middle third. Only three percent were in the upper third. Similarly, 56 percent of non-nest brooms were in the lower third, 34 percent were in the middle third and ten percent were in the upper third of the nest trees' crowns.

Platforms in Type 2 and 3 brooms with nests were larger than platforms of the same type in non-nest brooms (Table 2). Type 3 brooms were the largest. Type 1 brooms weren't measured because it was difficult to see them clearly very far up in the crowns.

| Table 2.        | Platform volume (ft <sup>3</sup> ) |        |
|-----------------|------------------------------------|--------|
|                 | Type 2                             | Type 3 |
| Nest brooms     | 10.6                               | 31.9   |
| Non-nest brooms | 1.7                                | 11.6   |

### Site Characteristics

Thirty-one percent of the nest plots were on the lower third of the slope, 37 percent were on the middle third and 26 percent were on the upper third. Twenty, 54 and 22 percent of the non-nest plots respectively, were on the lower, middle and upper third of the slope. Six percent of nest plots and two percent of non-nest plots were in draws. None of the nest plots and only two percent of non-nest plots were on ridge tops. Most of the plots, both nest and non-nest, were on north or east aspects. Most had three or four canopy layers. Average basal area per acre was 239 ft<sup>2</sup> in nest plots and 260 ft<sup>2</sup> in non-nest plots. Hardwoods were plentiful, especially Pacific madrone. Nest plots had an average of 0.6 snags per acre; non-nest plots averaged 0.3 per acre.

### Discussion:

In general, the nest trees and Douglas-fir trees immediately around them in the nest plots were relatively heavily infected. The remaining non-nest plots were a mixture of uninfected and lightly infected trees. The majority of stands had one or two heavily infected plots. The nest plot was often, but not always the most heavily infected plot. On average, 40 percent of the plots had some level of infection. The majority of owl nests were in Type 2 and 3 brooms that were low in the tree crowns and had large platforms compared to the platforms in other brooms. The owls nested most often in trees on the middle and lower third of the slopes.

We used these results to make recommendations for managing infected stands for current and replacement spotted owl nest habitat in the survey area:

Manage for several clumps of infected Douglas-fir covering one third to one half of a 20 acre nest stand. Ideally, current nest habitat might include one heavily infected clump having at least one Type 2 or Type 3 broom, and several lightly infected clumps.

Select infected clumps for replacement habitat that have infections confined to the lower third of the tree crowns as much as possible and manage them to maintain it in the lower third as long as possible. This will create the least impact on tree vigor.

Many nest trees and Douglas-fir trees in their immediate vicinity have half or more of their crowns occupied by brooms. Previous studies have shown that tree growth declines and

mortality increases significantly once this level of infection is reached (Pierce 1960, Mathiasen et al 1990, Filip et al 1991). Douglas-fir trees with heavy infections are also vulnerable to crown fires (Hawksworth and Wiens 1996). Therefore, we recommended managing for replacement nest trees. One way to create replacement nest trees might be to open the canopy around selected large diameter, vigorous trees with low BVRs and a Type 2 or Type 3 broom. This would allow the brooms to increase in size without significant impacts on the early growth of the tree.

Favor infected areas that are on the lower to middle third of the slope to minimize the rate of dwarf mistletoe spread from tree to tree through the stand.

This survey was a snapshot of the current status of spotted owl use of Douglas-fir dwarf mistletoe for nesting in one geographic area. Many questions remain, including how owls and their prey use Douglas-fir dwarf mistletoe brooms in the rest of their home range, how infected stands developed into suitable habitat, what will happen to these stands in the future and what the effects of silvicultural manipulation might be, both on the owls and the dwarf mistletoe.

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