

**YOUNG TREE PEST SURVEYS  
IN THE McBRIDE FOREST DISTRICT (SURVEY A)  
AND IN THE PRINCE GEORGE FOREST  
REGION (SURVEY B)**

by

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## FOREWORD

This report is one of a series of internal reports distributed by Forest Protection Branch, B.C. Ministry of Forests, to record accomplishments and interim or provisional results for the information of staff, colleagues, and others.

In the Canada-British Columbia Forest Resources Development Agreement (FRDA) 1985 to 1990, over 100 pest control projects were directly funded by the province and administered by protection staff. To facilitate application of the results, and development of improved forest health management strategies, the contractors reports have been edited and distributed as internal reports. Accordingly, any opinions and recommendations expressed are those of the contractor, and not necessarily those of the ministry or the FRDA management committee.

For details or more information about the report or project, please contact forest health staff at Protection Branch or at the forest region offices.

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The guidelines for internal reports outlined in the Protection Manual were adhered to as closely as possible. All manuscripts were altered to comply with a common format, but entire reports were not rewritten to conform to a standardized outline.

Most Executive Summaries were the work of Graham Hawkins of MoF Inventory Branch (formerly with Pacific Coast Forest Biology). All word processing was accomplished by Catriona Kaufman of Top Kat Services. Will Gordon of R. White Woods inc. prepared all maps and figures.

R. White, editor  
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## ABSTRACT

Two separate surveys were undertaken to assess pest damage. In both surveys, it was felt that further monitoring would help determine management options.

Survey A was conducted in eight plantations in the McBride Forest District, 13 to 15 years after establishment. The most common damage noted was caused by frost, with white spruce having the highest incidence by species. Genetically-improved planting stock may prove helpful to prevent such environmental damage.

Survey B was conducted in 41 plantations throughout the Prince George Forest Region, 14 to 23 years after establishment. *Pissodes terminalis* was identified as the pest causing the most damage.

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## **1 INTRODUCTION**

The objective of both "Young Tree Pest Surveys" was to evaluate the effects of current and previous pest attacks on juvenile stands. This was accomplished by surveying "established" plantations and assessing damage caused by insect, disease, animal or climatic factors.

Both survey results give an overview of pest status in the respective areas; however, due to the population size and sample unit distribution, they do not provide a realistic picture of subzone performance.

Monitoring plantation damage on a periodic basis will improve awareness of pest populations and will be useful in predicting the quality and quantity of the long-term wood supply.

## 2 MATERIAL AND METHODS

### 2.1 Survey A

The study consisted of eight plantations selected from the McBride Forest District (Table 1). The subzones represented were ESSFo, ICHj, ICHk and SBSg. The plantations were established between 1971 and 1973 and planted with either Douglas-fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), white spruce (*Picea glauca*) or combinations thereof. A natural component of these species also exists along with subalpine fir (*Abies lasiocarpa*) and non-commercial species.

### 2.2 Survey B

Forty-one plantations were selected from the Prince George Region (Table 2). The forest districts represented were Prince George West, Prince George East, Vanderhoof and Fort St. James. The plantations were established between 1963 and 1972 and planted with either Douglas-fir, lodgepole pine, white spruce or combinations thereof. A natural component of these species also exists along with subalpine fir and black spruce (*Picea mariana*). The plantations occurred in five different biogeoclimatic subzones (Table 1).

### 2.3 Both Surveys

In all plantations in both surveys parallel strip lines were established 200m apart, where possible, with a fixed radius plot occurring every 100m. The point of commencement, plot centres and end point were labelled for each strip. Damaged trees were recorded within five metres on either side of the strip centre line, and all residual trees were recorded within 20m.

One objective of the surveys was to obtain a relationship between healthy and damaged trees in the selected plantations. It was thus decided prior to the surveys to intentionally bias the plot locations in the field, where necessary, in order to avoid poorly stocked plots.

The guidelines established (Table 3) required judgement by the pest surveyor; however, survey consistency was stressed throughout the project. The surveys were concerned primarily with major forest pests (Table 4). Secondary attacks or uncommon pest attacks of low frequency which were not a threat to a particular plantation were recorded as "Su" (unknown). More serious "unknown" attacks and suspected root rot infections were sampled and submitted to ministry personnel for positive identification. Animal damage was categorized as large animal or small animal, and the suspected animal was noted.

### 3.0 RESULTS AND DISCUSSION

#### 3.1 Survey A

The data were summarized by plantation, species, subzone, and forest district using Lotus 1-2-3 application software. It was noted throughout the summary calculations that the strip data (which were based on plot stocking values) generally provided lower percentage attack values than the plot data. This can be attributed partially to inconsistent stocking in many of the plantations and partially to plot biasing and sampling error. The plot data may suggest higher than actual stocking levels were present in a portion of the plantations; however, the percentages of attacked versus total trees were felt to be accurate. Of the biogeoclimatic subzones sampled, the SBSg contained the highest percentage of damaged trees (34.1%) and the ICHk contained the lowest (20.5%). On a major species basis, lodgepole pine (30.6%) and Douglas-fir (6.0%) contained the highest and lowest percentage of damage, respectively.

On a forest district basis, there was an average of 1 199 trees per ha with 73.8% "good" trees and 26.2% damaged trees.

The most significant damage was by frost (11.8% of total trees), with white spruce having the greatest incidence by species (12.7%). Current attack by Warren's root collar weevil (3.2%) was also significant, affecting 8.5% of all lodgepole pine. *Sclerophoma* spp., discovered on Douglas-fir, caused leader dieback.

The ICHk and SBSg ecosystem interpretation fieldbooks were not available at the time of sampling. The relevant plantations were all mesic to slightly above mesic, and were therefore classified as "01" associations.

Survey productivity varied with plantation stocking, amount of damage (particularly for the strip lines), and the weather. The productivity figure for the field work portion of the survey was 31.6ha/manday or 15.8 plots/manday. This included preparing plantation summaries and mapping.

#### 3.2 Survey B

Prince George East Forest District contained the highest percentage of damaged trees (39.2%) and Vanderhoof Forest District contained the lowest (21.7%).

Of the biogeoclimatic subzones sampled, the SBSe2 contained the highest percentage of damaged trees (42.5%) and the SBSe1 the lowest (24.5%). Lodgepole pine and white spruce trees contained the highest and lowest percentage of damage, respectively (43.5% and 25.4%).

On a regional basis, there was an average of 1 404 trees per ha, with 68.7% "good" trees and 31.3% damaged trees based on plot data.

The most significant pest attacks were older lodgepole terminal weevil attack (3.9%) and western gall rust (3.6%). It should be noted that direct environmental factors (wind, snow, etc.) resulted in 9.6% of the damage. *Sclerophoma* spp. was discovered to be a pest of increasing concern in the Prince George Forest Region, attacking Douglas-fir and causing leader dieback. The northern pitch twig moth (*Petrova albicapitana*) was categorized as "Su-unknown"; however, both current and older attacks caused considerable damage to lodgepole pine, resulting in main stem dieback and subsequent forking.

Survey productivity varied with plantation stocking, amount of damage (particularly on the strip lines), and the weather. Locating the plantations on the map sheet was a major time-consumer with the given information. The productivity figure for the field work portion of the survey was 21.7ha/manday or 10.8 plots/manday. This includes training days with Regional and crew personnel, checking plantations to ensure quality control and consistency, obtaining maps and photos, locating plantations on map sheets, checking access, when necessary, plantation summaries and mapping.

#### 4 CONCLUSIONS AND RECOMMENDATIONS

Future sampling and monitoring of plantations and stands will provide a valuable database which should lead to improved information exchange and ultimately more intensive forest management. Improved site prescriptions should minimize detrimental "pest-host" conditions and thereby reduce damage.

##### Survey A

The survey results provided a useful indication of pest status in young stands in the McBride Forest District. Further research involving genetically-improved stock resistant to frost attack may help combat volume losses attributed to frost damage.

##### Survey B

Further studies on *Sclerophoma* spp. and *Petrova albicapitana* will determine their relative significance. Spacing projects in selected plantations may reduce wind damage on crop trees and eliminate competition.

**TABLE 1     SURVEY A PLANTATION SUMMARY**

| <b>Plantation<br/>(ISS<br/>Number)</b> | <b>Plantation<br/>Name</b> | <b>Planting<br/>Year</b> | <b>Project<br/>Number</b> | <b>Forest<br/>District</b> | <b>Subzone</b> |
|----------------------------------------|----------------------------|--------------------------|---------------------------|----------------------------|----------------|
| 1                                      | Horse Creek                | 1971                     | 83D011-2                  | McBride                    | ESSFo          |
| 2                                      | Ptarmigan Creek            | 1971                     | 93H10C-505                | McBride                    | ICHk           |
| 3                                      | Yellow Jacket Creek        | 1971                     | 83D11H-3                  | McBride                    | ICHj           |
| 4                                      | Ptarmigan Creek            | 1972                     | 93H10C-505A               | McBride                    | ICHk           |
| 5                                      | Catfish Creek              | 1973                     | 93H10C-500                | McBride                    | ICHk           |
| 6                                      | Catfish Creek              | 1973                     | 93H10C-501                | McBride                    | SBSg           |
| 7                                      | Dave Henry Creek           | 1973                     | 83D011-6                  | McBride                    | ICHj           |
| 8                                      | Ptarmigan Creek            | 19733                    | 93H10C-505B               |                            | ICHk           |

**TABLE 2 SURVEY B PLANTATION SUMMARY**

| Plantation<br>(ISS<br>Number) | Plantation<br>Name | Planting<br>Year | Project<br>Number | Forest<br>District | Subzone |
|-------------------------------|--------------------|------------------|-------------------|--------------------|---------|
| 1                             | Neck Lake          | 1969             | 93G-1             | P.G. East          | SBSs2   |
| 2                             | Hush Lake          | 1969             | 93-G-1-12         | P.G. East          | SBSs    |
| 3                             | Hush Lake          | 1968             | 93G-1-10          | P.G. East          | SBSs    |
| 4                             | Hush Lake          | 1971             | 93-G-1-38         | P.G. East          | SBSs    |
| 5                             | Neck Lake          | 1968             | 93G-8-4           | P.G. East          | SBSs    |
| 6                             | Neck Lake          | 1967             | 93G8-2            | P.G. East          | SBSs    |
| 7                             | Genevieve Lake     | 1967             | 93G8-1            | P.G. East          | SBSs2   |
| 8                             | Ross Lake          | 1970             | 93-G-8-6          | P.G. East          | SBSjl   |
| 9                             | Grizzly Lake       | 1969             | 93G-9             | P.G. East          | SBSjl   |
| 10                            | St. Marie Lake     | 1967             | 93G9-3            | P.G. East          | SBSs2   |
| 11                            | St. Mary Lake      | 1972             | 93-G-9-16         | P.G. East          | SBSs2   |
| 12                            | Pitoney Creek      | 1971             | 93G-9-13          | P.G. East          | SBSjl   |
| 13                            | Lynx Lake          | 1969             | 93G-10-6          | P.G. West          | SBSk3   |
| 14                            | Shesta Lake        | 1969             | 93G-10-7          | P.G. West          | SBSk3   |
| 15                            | Hutda Lake         | 1968             | 93G-10-3          | P.G. West          | SBSk3   |
| 16                            | Mt. Mackenzie      | 1972             | 93G10-20          | P.G. West          | SBSk3   |
| 17                            | Shesta Lake        | 1963             | 93G-10-1          | P.G. West          | SBSk3   |
| 18                            | Trapping Lake      | 1970             | 93-G-10-10        | P.G. East          | SBSs    |
| 19                            | Mt. Mackenzie      | 1971             | 93G-10-18         | P.G. West          | SBSk3   |
| 20                            | Cluculz Creek      | 1971             | 93G-13-2          | Vanderhoof         | SBSk3   |
| 21                            | Wansa Lake         | 1970             | 93-G-16-14        | P.G. East          | SBSjl   |
| 22                            | Wansa Lake         | 1964             | 93G16-2           | P.G. East          | SBSjl   |
| 23                            | Wansa Lake         | 1965             | 93G16-3           | P.G. East          | SBSjl   |
| 24                            | Kenneth Creek      | 1972             | 93-H-13-8         | P.G. East          | SBSjl   |
| 25                            | N. Purden          | 1972             | 93-H-13-9         | P.G. East          | SBSjl   |

**TABLE 3    SAMPLING GUIDELINES**

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**Damage Recorded**

- A. All pest attacks (Table 2) within the strip line boundaries or plot radius resulting in:
  - 1. damage to the current leader, root collar and/or roots;
  - 2. damage affecting >30% of the stem circumference or >30cm in length;
  - 3. damage affecting >30% of the branches or foliage, or >50% in the case of *Adelges cooleyi*.
- B. Specify current (two years) versus older damage for leader weevils, aphids, root collar weevils and animal damage.
- C. All mistletoe attacks.
- D. Tree status (good, fair, poor, dead) within plots.
- E. Tree status for damage strip trees (dead standing, dead down, broken, top, live windthrow, infected stump).

TABLE 4 DAMAGE CODES

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|    |                                  |                                                                                                                               |
|----|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Ls | - spruce weevil                  | - <i>Pissodes strobi</i>                                                                                                      |
| Lp | - lodgepole terminal weevil      | - <i>Pissodes terminalis</i>                                                                                                  |
| F  | - foliage attack                 |                                                                                                                               |
| Ba | - spruce gall aphid              | - <i>Adelges cooleyi</i>                                                                                                      |
| Bp | - pine aphids                    | - <i>Pinneus</i> spp.                                                                                                         |
| Mp | - lodgepole pine dwarf mistletoe | - <i>Arceuthobium tsugense</i>                                                                                                |
| Rt | - <i>Inonotus tomentosus</i>     |                                                                                                                               |
| Ra | - <i>Armillaria ostoyae</i>      |                                                                                                                               |
| Rf | - <i>Fomes annosus</i>           |                                                                                                                               |
| Rl | - laminated root rot             | - <i>Phellinus weirii</i>                                                                                                     |
| Rb | - black stain root disease       | - <i>Verticicladiella wagnerii</i>                                                                                            |
| CW | - Warren's collar weevil         | - <i>Hylobius warreni</i>                                                                                                     |
| Sg | - western gall rust              | - <i>Endocronartium harknessi</i>                                                                                             |
| Sc | - cankers                        | - <i>Atropellis piniphila</i> , <i>Diaporthe</i><br>( <i>Phomopsis</i> ) <i>lokoyae</i> , <i>Sclero-</i><br><i>phoma</i> spp. |
|    |                                  |                                                                                                                               |
| Sr | - rusts                          |                                                                                                                               |
| Sj | - small animal                   |                                                                                                                               |
| Sl | - large animal                   |                                                                                                                               |
| Ss | - snow damage                    |                                                                                                                               |
| Sf | - frost damage                   |                                                                                                                               |
| Si | - ice damage                     |                                                                                                                               |
| Se | - excess water                   |                                                                                                                               |
| Sd | - deficient water                |                                                                                                                               |
| Sw | - wind damage                    |                                                                                                                               |
| Sk | - red belt                       |                                                                                                                               |
| Sa | - mechanical damage              |                                                                                                                               |
| Su | - unknown                        |                                                                                                                               |
|    | (PM) - northern pitch twig moth  | - <i>Petrova albicapitana</i>                                                                                                 |
|    | (OF) - old fork                  |                                                                                                                               |
| ds | - dead standing                  |                                                                                                                               |
| dd | - dead down                      |                                                                                                                               |
| bt | - broken tip                     |                                                                                                                               |
| dt | - dead top                       |                                                                                                                               |
| ld | - live down                      |                                                                                                                               |
| is | - infected stump                 |                                                                                                                               |
| C  | - current                        |                                                                                                                               |
| O  | - older                          |                                                                                                                               |
| R  | - residual                       |                                                                                                                               |