

# Forest Health Program



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Forest Health Program

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## Table of Contents

|     |                                                                                         |    |
|-----|-----------------------------------------------------------------------------------------|----|
| 1.  | Introduction .....                                                                      | 2  |
| 1.1 | Issues .....                                                                            | 2  |
| 2.  | Service Plan and Performance Management .....                                           | 3  |
| 3.  | Provincial Legislation and Policy .....                                                 | 4  |
| 4.  | Forest Health Program: Goal and Objectives .....                                        | 4  |
| 5.  | Program Emphasis Areas .....                                                            | 4  |
| 5.1 | Policy Support .....                                                                    | 5  |
| 5.2 | Program Delivery .....                                                                  | 6  |
| 5.3 | Adaptive Management .....                                                               | 7  |
| 6.  | Partners .....                                                                          | 8  |
| 7.  | Research .....                                                                          | 8  |
| 7.1 | Operational Research Trials .....                                                       | 9  |
| 8.  | Related Initiatives .....                                                               | 9  |
| 8.1 | Mountain Pine Beetle Action Plan .....                                                  | 9  |
| 8.2 | Forests for Tomorrow Program .....                                                      | 10 |
| 8.3 | Forest and Range Evaluation Program .....                                               | 10 |
| 8.4 | Future Forest Ecosystems Initiative .....                                               | 11 |
| 9.  | Budget .....                                                                            | 11 |
|     | Appendix 1. List of the Most Important Biotic Damaging Agents in British Columbia ..... | 12 |

## List of Figures

|           |                                                              |   |
|-----------|--------------------------------------------------------------|---|
| Figure 1. | Forest Health Program and administrative relationships ..... | 3 |
| Figure 2. | Forest Health Program functions .....                        | 5 |

## List of Tables

|          |                                                                                                                                                 |    |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------|----|
| Table 1. | Percent operating budget by forest health function, excluding staff salaries, invasive plant and biocontrol programs, and federal funding ..... | 11 |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------|----|



## 1. Introduction

A healthy forest is naturally resilient to damage. Insects and pathogens are natural components of healthy forests, and the magnitude of damage caused by these agents is normally limited by host and climate factors. Forest health problems arise when limiting factors are ineffective or overcome—for example, with climate change.

The purpose of this document is to provide a high-level description of the Forest Health Program of the Ministry of Forests and Range, including its goals, objectives, and priorities, along with the program's linkages to ministry policy, administrative processes, and related government initiatives.

### 1.1 Issues

The Forest Health Program addresses five key issues, or drivers, that forest managers are currently facing in British Columbia, as described below.

First, British Columbia has many tree species at high risk of pest damage, and active and large-scale outbreaks of various pests are producing significant consequences in British Columbia's forests (Appendix 1). These pest outbreaks<sup>1</sup> are leading to losses in standing timber inventories and to impacts on water, soil, and biodiversity. This affects allowable annual cut determinations and forest management practices, and the social and economic consequences of these losses affect communities and government revenue.



Where environmental conditions favour infection of **Dothistroma needle blight**, this pathogen can spread quickly and cause significant damage.

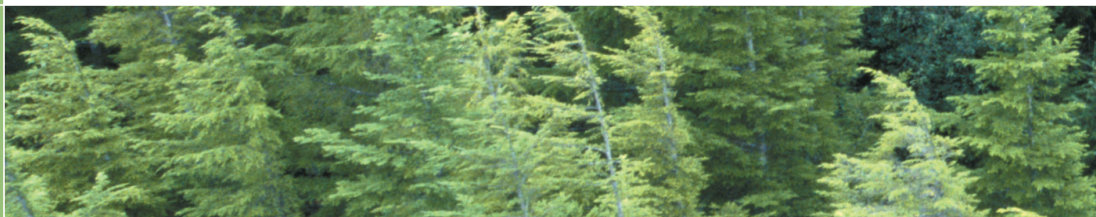
Second, international trade and export controls require the eradication of some exotic pests, such as the gypsy moth.

Third, climate change will place an even greater emphasis on the need for forest health monitoring and research. This is because of the degree of uncertainty associated with both the direct and indirect effects of changing temperatures and related trends.

Fourth, the introduction and spread of a variety of invasive plant species are adversely affecting ecological, economic, and social values. Among their many impacts, invasive plants threaten rare and endangered species, reduce land values and crop and forage yields, and decrease land and aquatic recreational use.

And last, the current legislative framework enshrines results-based forest management and professional reliance. The challenge for forest professionals is to manage for forest health at each stage of stand development.

<sup>1</sup> Detailed descriptions of pests and the tree species they affect are published in two annual ministry publications: *Summary of Forest Health Conditions in British Columbia* and *Overview of Forest Health in the Southern Interior Forest Region*.



## 2. Service Plan and Performance Management

The Forest Health Program is designed to support the ministry's goal of sustainable forest and range resources under the objective of preventing and managing wildfire and forest pests. The ministry's strategies for preventing and managing forest pests are found in its annual Service Plan:

1. Implement the Mountain Pine Beetle Action Plan.
2. Annually detect, assess, and treat priority insect infestations other than mountain pine beetle, including gypsy moth and other defoliators.
3. Monitor and evaluate forest health status and implement best management practices in support of the timber supply review and protection of the 11 resource values under the *Forest and Range Practices Act* (biodiversity, cultural diversity, forage, fish, recreation, resource features, soils, timber, visual quality, water, and wildlife).

Figure 1 shows the relationships among the provincial Forest Health Strategy,<sup>2</sup> the Forest Health Program, the legislative framework, the ministry's Service Plan, lower-level strategies, and program delivery.

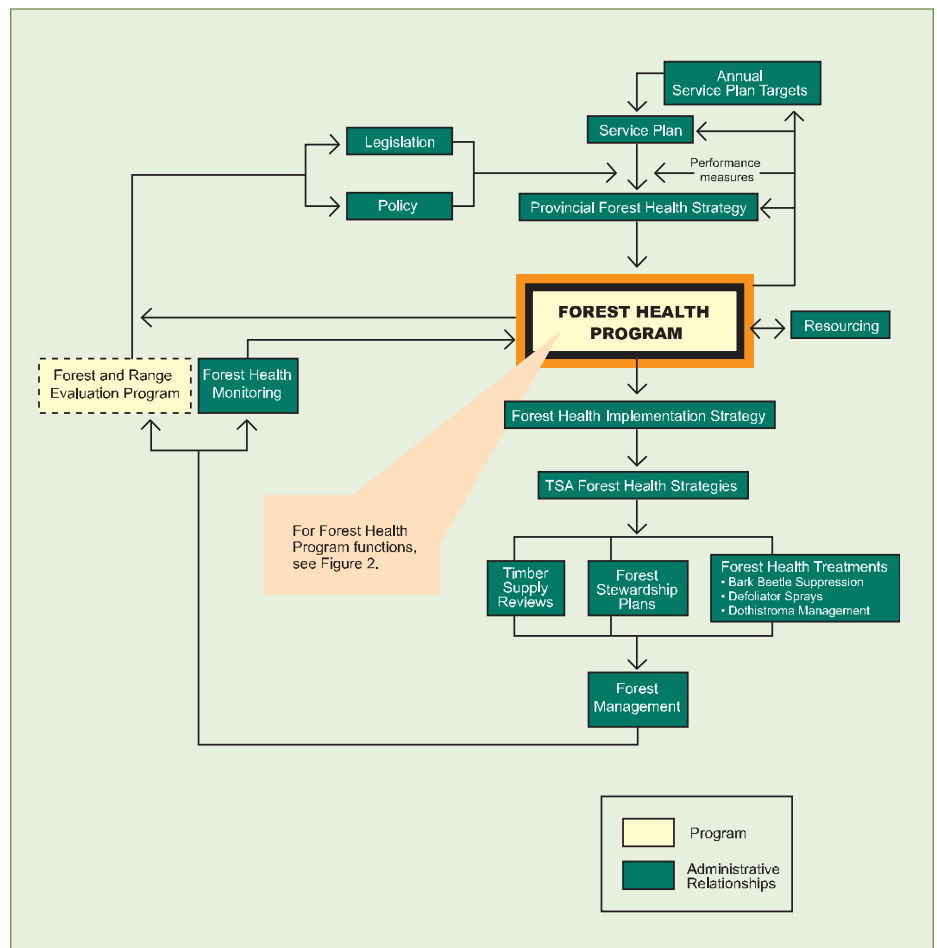
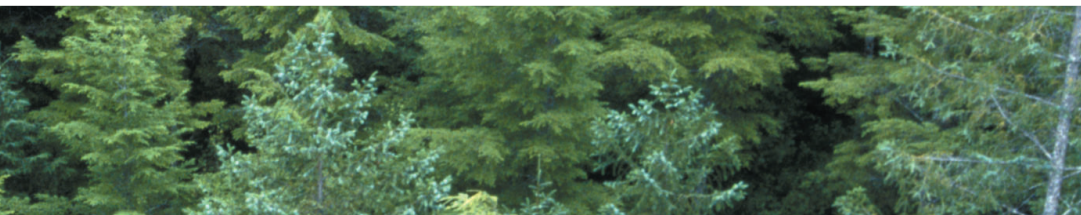


Figure 1. Forest Health Program and administrative relationships.

<sup>2</sup>Ministry of Forests and Range. 2007. Forest health strategy. Available at: [www.for.gov.bc.ca/hfp/health/index.htm](http://www.for.gov.bc.ca/hfp/health/index.htm)



### 3. Provincial Legislation and Policy

The Forest Planning and Practices Regulation under the *Forest and Range Practices Act* includes key sections relating to forest health. For example, in Forest Stewardship Plans, species selected for reforestation must address immediate and long-term forest health risks. These risks are identified in annually updated forest health strategies for each Timber Supply Area. Furthermore, under the Chief Forester's Standards for Seed Use, tree seed identified with genetic resistance to a forest pest must be selected if it would best achieve the forest management objectives for the stand.

### 4. Forest Health Program: Goal and Objectives

The goal of the Forest Health Program is to manage pests to meet forest management objectives.

The provincial government's three key strategic forest health objectives are to:

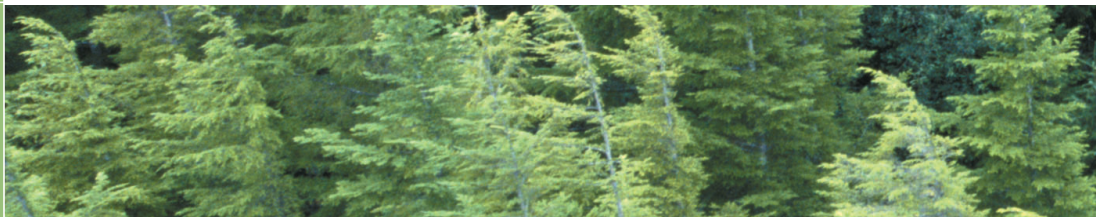
1. Protect forest resources from pest damage by direct actions when operationally possible and justified;
2. Implement stand establishment activities to minimize the expected impact of known forest pests; and
3. Assess pest impacts on forest values to improve estimates of timber yield from British Columbia's forests and prioritize management interventions.

### 5. Program Emphasis Areas

The application of the Forest Health Program is based on four key principles:

1. Know the landbase and the resource management objectives.
2. Manage from an ecological perspective.
3. Apply best management practices.
4. Practise adaptive management.

The Forest Health Program is comprised of three emphasis areas: policy support, program delivery, and adaptive management. Each emphasis area is described below with its intended outcome, specific outputs, functions, key objectives, and performance measures (Figure 2).



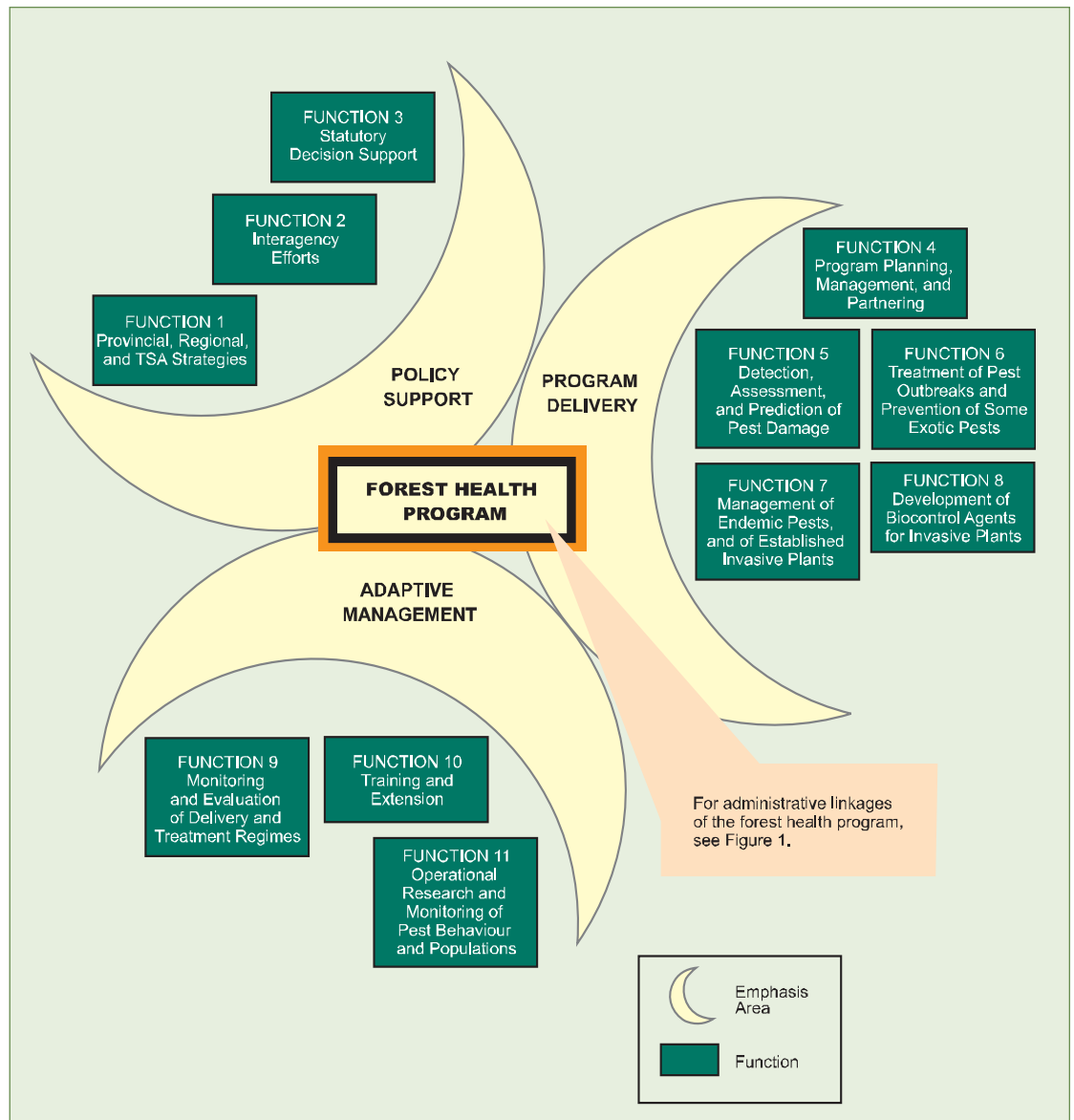


Figure 2. Forest Health Program functions.

## 5.1 Policy Support

Policy support is undertaken to address large-scale pest outbreaks, management of exotic pests, and interagency efforts. The intended outcome of this emphasis area is that the resource values under the *Forest and Range Practices Act* are protected through the implementation of forest health strategies for management units. The chief outputs are forest health strategies at both the provincial and management unit levels, the Mountain Pine Beetle Action Plan, and a provincial invasive plant strategy.



### 5.1.1 Functions

1. Development of provincial, regional, and Timber Supply Area forest health strategies
2. Participation in interagency efforts
3. Support of statutory decision-makers (mainly ministry district managers)

### 5.1.2 Key Objectives and Performance Measures

1. Updated forest health strategies  
*Performance measure: Number of completed or updated forest health strategies*
2. Legislation, policies, and best management practices consistently implemented in operational plans and practices (e.g., Forest Stewardship Plans and Timber Supply Area bark beetle management tactical plans)  
*Performance measure: Statutory decision-maker level of satisfaction (percent) with forest health support provided*

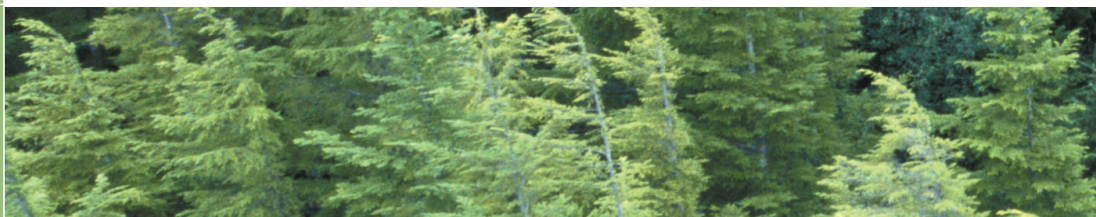
## 5.2 Program Delivery

The intended outcome of this emphasis area is that timber supply losses are mitigated and management objectives are attained by the effective delivery of the Forest Health Program. This relates to all of the program drivers. The chief output is the *Summary of Forest Health Conditions in British Columbia*.



**Western hemlock looper** causes significant mortality and growth loss to western hemlock and western redcedar during short-lived, but explosive, outbreaks.

Forest health specialists manage for a wide range of biotic damaging agents and they apply hazard and risk ratings to the results of surveys, inventories, and monitoring activities to determine priority pests and areas for treatment. Priorities are consistent with management assumptions both for timber supply and government objectives for forest management.



### 5.2.1 Functions

1. Program planning, management, and partnering
2. Detection, assessment, and prediction of pest damage
3. Treatment of pest outbreaks and prevention of the establishment of some exotic pests (e.g., gypsy moth and yellow starthistle)
4. Management of endemic pests and established invasive plants during forest operations
5. Development of agents for biological control of invasive plants

### 5.2.2 Key Objectives and Performance Measures

1. Updated surveys, assessments, and forecasts  
*Performance measure: Percent of Crown forest aerially surveyed to monitor forest health*
2. Annual treatment plans implemented  
*Performance measures: Number of hectares treated for native defoliators; percent of exotic pest introductions addressed; percent of mountain pine beetle aggressive emergency management units, parks, and protected areas that achieve treatment targets; percent of beetle management units receiving suppression treatment for species other than mountain pine beetle; percent of at-risk sites treated in parks and protected areas to mitigate impacts of the mountain pine beetle*
3. Implemented best management practices  
*Performance measure: Percent of results-based stands monitored that incorporate best management practices for forest health*

### 5.3 Adaptive Management

Adaptive management combines management, research, monitoring, and ways to change practices so that management activities are improved based on experience. The intended outcome of this emphasis area is that science-based management be delivered by proficient forest practitioners, who know how to best alter practices to meet the expectations of professional reliance. Key outcomes include research papers and reports, training tools, bioagent guidebooks, and extension materials.



**Western spruce budworm** is a major defoliator of Interior Douglas-fir, and it causes growth loss, form damage, and mortality.



### 5.3.1 Functions

1. Monitoring and evaluation of delivery and treatment regimes
2. Facilitation or provision of training and extension activities
3. Operational research and monitoring of pest behaviour and populations (natural and managed)

### 5.3.2 Key Objective and Performance Measure

1. Priority training and extension needs identified and addressed

*Performance measure: Number of forest health training and extension events delivered*

## 6. Partners

The Ministry of Forests and Range conducts the Forest Health Program in collaboration with other provincial ministries, the forest industry, and federal agencies. The ministry's main partners are the Ministry of Agriculture and Lands, the Ministry of Environment, forest companies, the Canadian Forest Service, universities, and the Canadian Food Inspection Agency. The Ministry of Forests and Range is also contributing to a National Forest Pest Strategy under the auspices of the Canadian Council of Forest Ministers.

Forest companies may apply to the Forest Investment Account land-based investment program for funding to carry out forest health functions.

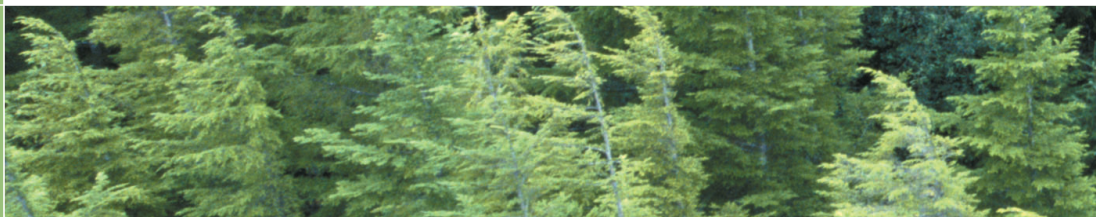


**White pine blister rust** is an introduced pathogen, and most natural populations of white pine are highly susceptible.

## 7. Research

The ministry's Forest Health Program relies on research results from different external agencies and institutions. Through the Canadian Forest Service's Pacific Forestry Centre, the federal government conducts entomology and pathology research on forest insect and pathogen physiology and life cycles. It also develops biological pesticides and alternative controls, and oversees research that addresses forest health knowledge needs. As well, the federal government has targeted funding for research projects related to the mountain pine beetle, which can provide forest health information.

Universities conduct both short- and long-term forest health research in entomology and pathology, as well as training highly qualified specialists.



The ministry's Research Branch has produced a Mountain Pine Beetle Stewardship Research Strategy that identifies and prioritizes knowledge gaps related to the mountain pine beetle epidemic and to the ministry's stewardship functions.

Ministry research on seed pests helps to ensure a future supply of genetically improved seeds for reforestation. The goal of seed pest research is to reduce seed loss from conifer seed orchards in British Columbia. The results are used by seed orchard managers in commercial seed production systems. Additionally, through provincial tree improvement programs, seed and vegetative propagules are being selected for increased resilience to climate change and for reduced susceptibility to pests.

The ministry also collaborates with FPInnovations in forest health research. FPInnovations conducts wood products research and technology transfer, and serves as a knowledge centre for the Canadian wood products sector.

## 7.1 Operational Research Trials

Ministry forest health specialists conduct long- and short-term operational research trials that address key concerns pertaining to the impacts and management of pests. Long-term trials are established and monitored to develop indicators of change, conduct effectiveness evaluations of management regimes, and assess the impacts of various forest pests on management practices at both the stand and landscape levels. Short-term trials are designed to test new treatment options for the improvement of management practices.

## 8. Related Initiatives

The Forest Health Program managed by the Ministry of Forests and Range operates in conjunction with many external and internal relationships. Key initiatives are briefly described below.

### 8.1 Mountain Pine Beetle Action Plan

The Mountain Pine Beetle Action Plan describes the provincial government's response to the mountain pine beetle epidemic. It provides guidance to all groups involved in mitigation efforts for forest values, communities, and the provincial economy in the short term, and sustainability in the long term.

Through the provision of funding by the Government of Canada,



**Mountain Pine Beetle** is the most destructive insect pest in British Columbia. It kills all pine species.



British Columbia will help mitigate the economic, environmental, and social challenges created by the mountain pine beetle infestation. The Canada–BC Mountain Pine Beetle Emergency Response has strategies to:

- Reduce potential wildfire threats to communities and First Nations;
- Control the spread of the infestation;
- Help communities and First Nations plan for community diversification and stability in light of predicted declines in the allowable annual cut;
- Research and develop new products and applications for beetle-killed wood;
- Apply research toward conservation of forest values;
- Provide the bio-physical information necessary to assess the program’s success;
- Update timber and non-timber inventories; and
- Restore ecosystems.

## 8.2 *Forests for Tomorrow Program*

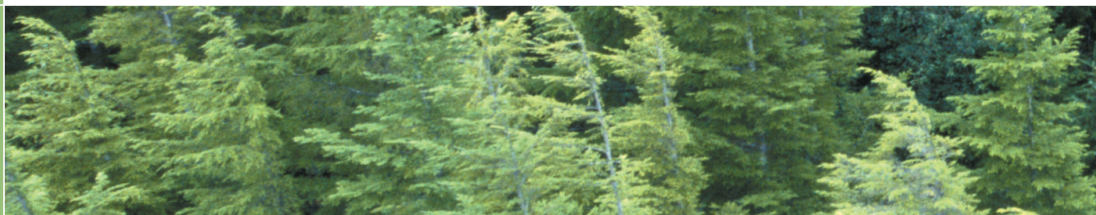
Forests for Tomorrow was established to reforest the growing area of understocked Crown forest land. The program was designed to improve the future timber supply, initially focusing on recent wildfires and the mountain pine beetle epidemic, through silviculture treatments, and to reduce the risks to biodiversity, water, fish, wildlife, and habitat. Activities focus on land that is primarily within the Timber Harvesting Land Base but with no reforestation obligations. In British Columbia, licensees are required by law to reforest the areas they harvest. However, there remain areas affected by the mountain pine beetle that will not be harvested, and the Forests for Tomorrow Program will address them. The strategic approach under Forests for Tomorrow requires that all resource values, both timber and non-timber, are considered and enhanced.



**Tomentosus root rot** is most frequently found in the spruce–fir forests of central and northern British Columbia.

## 8.3 *Forest and Range Evaluation Program*

The Forest and Range Evaluation Program is a multi-agency initiative designed to determine if forest and range policies, practices, and legislation are achieving government’s objectives for the 11 resource values under the *Forest and Range Practices Act*. A primary goal of the program is to evaluate and monitor the health of these resource values by identifying status and trends. Through the Forest and Range Evaluation Program, government will be able to ensure that it has the science-based knowledge necessary for sustainable resource management decision-making.



## 8.4 Future Forest Ecosystems Initiative

The Future Forest Ecosystems Initiative is exploring opportunities to adjust approaches to forest management in response to rapidly changing conditions that affect the distribution, composition, and productivity of ecosystems. The goal is to respond effectively to current and future changes—both environmental (climate) and ecological (fire and biotic agents)—by adapting the current forest management framework in British Columbia to achieve resilient forest ecosystems.

The uncertainty of climate change and its effects on forest ecosystems necessitates new, collaborative research to predict and forecast changes in timber supply from pests, and to design integrated strategies for pest management and silvicultural practices that will mitigate timber supply falldowns related to forest health issues.

## 9. Budget

The provincial budget for the Forest Health Program is allocated by program function, as shown in Table 1. Detailed ministry resource allocation by core business is provided in the service plan. For a summary of resources for forest health, see the provincial forest health strategy.

**Table 1. Percent operating budget by forest health function, excluding staff salaries, invasive plant and biocontrol programs, and federal funding. Function number is that shown in Figure 2.**

| Emphasis Area       | Function Number | Program Function                                                      | Percent of Operating Budget |
|---------------------|-----------------|-----------------------------------------------------------------------|-----------------------------|
| Policy Support      | 1               | Provincial, regional, and TSA strategies *                            | 2                           |
|                     | 2               | Interagency efforts *                                                 | 0                           |
|                     | 3               | Statutory decision support *                                          | 2                           |
| Program Delivery    | 4               | Program planning, management, and partnering *                        | 0                           |
|                     | 5               | Detection, assessment, and prediction of pest damage                  | 22                          |
|                     | 6               | Treatment of pest outbreaks and prevention of some exotic pests       | 66                          |
|                     | 7               | Management of endemic pests, and of established invasive plants *     | 0                           |
|                     | 8               | Development of biocontrol agents for invasive plants                  | 0                           |
| Adaptive Management | 9               | Monitoring and evaluation of delivery and treatment regimes           | 3                           |
|                     | 10              | Training and extension *                                              | 1                           |
|                     | 11              | Operational research and monitoring of pest behaviour and populations | 4                           |
| <b>Total</b>        |                 |                                                                       | <b>100</b>                  |

\*Ministry forest health staff perform these functions.

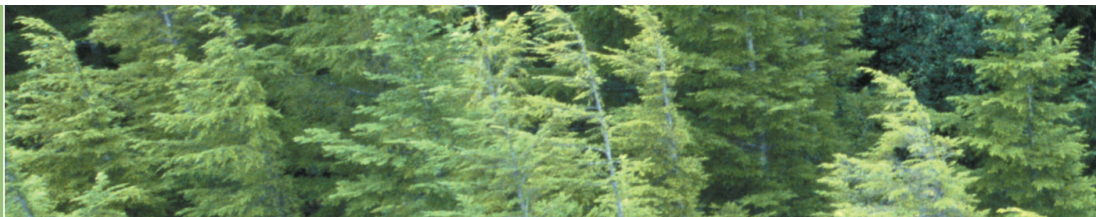


## Appendix 1. List of the Most Important Biotic Damaging Agents in British Columbia

| Damaging Agent 1                | Management Priority 2 | Impact to timber supply known? 3 | Potential impact on forest values 4 | Management strategies available? 5                   | Performance measurable? 6 | How measured? 7 |
|---------------------------------|-----------------------|----------------------------------|-------------------------------------|------------------------------------------------------|---------------------------|-----------------|
| Armillaria root disease         | VH                    | (Yes)                            | High                                | Yes                                                  | Yes                       | G&Y, FG         |
| Gypsy moth                      | VH                    | Yes                              | NA                                  | Yes                                                  | Yes                       | PM              |
| Mountain pine beetle            | VH                    | Yes                              | Severe                              | Yes                                                  | Yes                       | PM              |
| Spruce beetle                   | VH                    | Yes                              | High                                | Yes                                                  | Yes                       | PM              |
| Dothistroma needle blight       | H                     | Yes                              | High                                | Yes                                                  | Yes                       | FG              |
| Comandra blister rust           | H                     | Yes                              | Moderate                            | Yes                                                  | Yes                       | G&Y             |
| Laminated root rot              | H                     | (Yes)                            | Moderate                            | Yes                                                  | Yes                       | G&Y, FG         |
| Tomentosus root rot             | H                     | (Yes)                            | Moderate                            | Yes                                                  | Yes                       | G&Y, FG         |
| Western spruce budworm          | H                     | Yes                              | Moderate                            | Yes                                                  | Yes                       | PM              |
| White pine blister rust         | H                     | Yes                              | High                                | Yes                                                  | Yes                       | G&Y, FG         |
| Douglas-fir beetle              | M                     | Yes                              | Moderate                            | Yes                                                  | Yes                       | PM              |
| Douglas-fir tussock moth        | M                     | Yes                              | Moderate                            | Yes                                                  | Yes                       | PM              |
| Eastern spruce budworm          | M                     | (Yes)                            | Moderate                            | Yes                                                  | Yes                       | PM              |
| Lodgepole pine dwarf mistletoe  | M                     | (Yes)                            | Moderate                            | Yes                                                  | (Yes)                     | G&Y, FG         |
| Western hemlock dwarf mistletoe | M                     | (Yes)                            | Moderate                            | Yes                                                  | (Yes)                     | G&Y, FG         |
| Western hemlock looper          | M                     | (Yes)                            | Moderate                            | Limited reactive strategies, no proactive strategies | (Yes)                     | (PM)            |
| Pine needle cast                | M                     | (Yes)                            | Moderate                            | No                                                   | NA                        | NA              |
| Western balsam bark beetle      | M                     | (Yes)                            | Moderate                            | No                                                   | NA                        | NA              |

### Notes:

1. An operational detection method is available for each damaging agent.
2. VH = very high, H = high, M = medium.
3. Stand- and forest-level impact data are collected and analyzed.  
Yes = operational methods are available, although application may be limited by budget or legal obligation.  
(Yes) = limited information, research in progress to determine.
4. Relates to the 11 values listed in the *Forest and Range Practices Act*. NA = not applicable.
5. Refers to both reactive and proactive management strategies, except as shown for western hemlock looper.
6. Yes = operational methods are available, although application may be limited by budget or legal obligation.  
(Yes) = limited information, research in progress to determine.
7. G&Y = growth and yield assessment, FG = free-growing survey, PM = performance measure established, (PM) = performance measure under development.







For more information visit:  
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