Responsibilities for Forest Health Management

Forest land ownership determines the responsibility for forest health management (Figure 1). The provincial Ministry of Forests and Range conducts forest health management on 59 million hectares of Crown forest land in British Columbia. The forest industry manages for forest health to meet free-growing standards in young stands and additionally treats some small areas on behalf of the ministry through the Forest Investment Account. Tree Farm Licence holders are responsible for the detection of pests on their tenured Crown land for treatment by either the licensee or the ministry. Forest health activities on the private portion of Tree Farm Licences and all other private forest land in British Columbia are the responsibility of the landowner. The detection and treatment of forest pests in parks and protected areas are the responsibility of the respective government managing the area, whether provincial or federal.

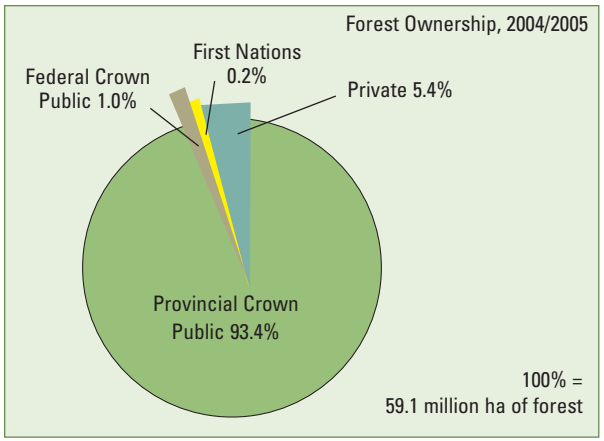

Figure 1. Forest land by ownership.

Three-Year Strategy for the Forest Health Program

The overall three-year strategy (2008/09–2010/11) for the ministry's Forest Health Program is to monitor and evaluate forest health status, and implement best management practices in support of the timber supply review and the protection of other forest values. This strategy is implemented through the ministry's Forest Health Program (please refer to the Forest Health Program publication) for which the key functions are detailed in Table 3.

To address the key functions of the Forest Health Program, the ministry plans to have a stable operational budget over the next three fiscal years (2008/09 through 2010/11) for application to the detection and monitoring functions. Key strategies and estimated annual expenditures for key pests are provided in Table 4. This does not, however, address uncertainty about gypsy moth and other exotic pests, and significant increases in the treatment of more extensive infestations by western spruce budworm, Douglas-fir beetle, and spruce beetle over the next three years. This uncertainty is addressed through monitoring, assessment, and budgetary review.

For more information visit:
www.for.gov.bc.ca/hfp/health/

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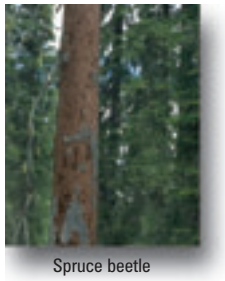

Spruce beetle


Tent caterpillar


Tomentosus root disease


Western balsam bark beetle


Western hemlock looper

Provincial Forest Health Strategy

BRITISH COLUMBIA
The Best Place on Earth

Ministry of Forests and Range

2008/09 – 2010/11

Introduction

What Is Forest Health?

Forest ecosystems encompass a wide variety of organisms and biological processes. A healthy forest has biodiversity, ecosystem resilience, wildlife habitat, aesthetic appeal, and resource sustainability. Insects, pathogens, wildlife species, and weather conditions play important roles in the characteristics and development of healthy forest ecosystems throughout British Columbia. Under certain conditions, a change in ecosystem balance can result in pest outbreaks that lead to unacceptable damage and economic loss.

What Are Forest Pests?

Forest pests include insects, pathogens, and some animals. Insect types include bark beetles, defoliators, and weevils; examples of pathogens are root rots, stem rusts, and needle blights. Even some animals—squirrels, hares, porcupines, deer, and other mammals—can cause deleterious levels of damage to some forests. Forest pests can kill or damage a relatively high volume of timber. In fact, annual timber losses from insect infestations alone far exceed those caused by fire.

Why Do We Need a Forest Health Strategy?

Through the implementation of this forest health strategy, the Ministry of Forests and Range manages British Columbia's forest resources to sustain healthy forests and provide social, environmental, and economic benefits to the province.

What Does the Ministry of Forests and Range Do for Forest Health?

In managing the Crown forest land that comprises 93% of British Columbia's forests, the Ministry of Forests and Range is responsible for monitoring the levels of forest damage inflicted by different pests. When pests affect forest resource values, ministry staff determine the feasibility of management intervention.

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 treatments.

Environment, Hosts, and Pests

Different forest pests rely on certain host tree species to complete their life cycle (Table 1). The wide variety of environmental conditions throughout British Columbia affect the predominant host tree species and their associated forest pests. For example, both western spruce budworm and Armillaria root rot are found primarily in the warmer southern half of the province, even though the ranges of their specific hosts extend further north.

Changing environmental conditions through predicted climate change can affect either, or both, the host and pest. For example, lodgepole pine, the host for mountain pine beetle, is more extensive in area than the present range of the beetle, which is limited by winter low temperatures of approximately -40 degrees Celsius. Warmer winter temperatures allow the beetle's range to expand northwards and eastwards, as well as higher in elevation.

Forest health management strategies will require flexibility to account for increasing temperatures and changing climates over this century. Choosing the right strategies can be a challenge because it is difficult to predict which trees will form future forests and which pests will become major disturbance factors. Forest health managers are engaged in various ministry initiatives related to identifying adaptive strategies for climate change.

Detection and Treatment

The ministry annually surveys provincial forests to assess pest damage. Current survey data are critical for effective delivery of the Forest Health Program. The provincial overview survey costs about $1 million annually. Annual forest pest surveys enable early detection and assessment

of pest outbreaks to quantify their impacts and to determine the most efficient use of treatment funds. Table 2 lists the most important forest pests in British Columbia with the estimated area of infestation or infection, and treatment options.

Ministry specialists assess the relative risks of different forest pests using annual survey data to determine priorities for treatment. The ministry's present funding priorities by forest health function (Table 3) show that 22 percent and 66 percent of the annual operating budget of the Forest Health Program are allocated for pest detection and treatment, respectively.

Table 1. Predominant tree species and key native forest pests

Tree Species	Key Native Forest Pests
Western hemlock	Western hemlock looper Black-headed budworm Hemlock dwarf mistletoe
Western redcedar	Western hemlock looper Decays Deer
Douglas-fir	Douglas-fir bark beetle Western spruce budworm Root diseases
True fir	Western balsam bark beetle Two-year-cycle budworm Western hemlock looper
Spruce	Spruce beetle Spruce leader weevil Tomentosus root disease
Lodgepole pine	Mountain pine beetle Dothistroma needle blight Stem rusts
Ponderosa pine	Mountain pine beetle Western pine beetle Elytroderma needle cast
Broadleaf species	Tent caterpillar Large aspen tortrix Cankers


Laminated root rot


Spruce weevil


Dothistroma needle blight


Douglas-fir bark beetle


Western gall rust

Table 2. Native forest pests by host tree species, area damaged, and treatment options

Type of Pest	Pest (Common Name)	Host Tree Species	Area Damaged in 2006[1] or Known Pest Distribution	Treatment Options
Bark Beetles	Mountain pine beetle	Lodgepole pine, ponderosa pine	9,243,400 ha	Harvesting, single-tree treatments, prescribed burning, baiting
	Spruce beetle	Interior spruce, Sitka spruce	83,660 ha	Harvesting, single-tree treatments, trap trees
	Douglas-fir beetle	Douglas-fir	60,700 ha	Harvesting, single-tree treatments
	Western balsam bark beetle	Subalpine fir	1,194,170 ha	Harvesting
Defoliators	Western spruce budworm	Douglas-fir	776,720 ha	Aerial Btk spray
	Douglas-fir tussock moth	Douglas-fir	0 ha	Aerial virus spray
	Eastern spruce budworm	Interior spruce, subalpine fir	0 ha	Aerial Btk spray
	Western hemlock looper	Western hemlock, western redcedar	1,740 ha	Aerial Btk spray
Pathogens	Armillaria root rot	All conifers	Throughout southern BC	Stumping, plant alternative species
	Laminated root rot	All conifers except western redcedar	Throughout southern BC	Stumping, plant alternative species
	Tomentosus root rot	Interior spruce, lodgepole pine	Throughout the BC Interior	Stumping, plant alternative species
	Comandra blister rust	Lodgepole pine	Throughout range of host species	Pruning
	White pine blister rust	Western white pine, whitebark pine	Throughout range of host species	Pruning, plant resistant stock
	Lodgepole pine dwarf mistletoe	Lodgepole pine	Throughout range of host species	Harvesting, sanitation cutting
	Western hemlock dwarf mistletoe	Western hemlock	Throughout range of host species	Harvesting, sanitation cutting
	Dothistroma needle blight	Lodgepole pine	2,890 ha	Plant alternative species
	Pine needle cast	Lodgepole pine	0 ha	None

[1] Updated survey data are available at calendar year-end at www.for.gov.bc.ca/hfp/health/overview/overview.htm

Table 3. Ministry operations budget by key functions for the current and next three fiscal years (excludes salaries, and invasive plant and biocontrol programs)

Forest Health Key Functions	Present Budget (2007/08)	Percent of Total Present Budget	2008/09 Budget	2009/10 Budget	2010/11 Budget
Planning and administration	$466,000	4	$466,000	$466,000	$466,000
Detection, assessment, and prediction	$2,291,000	22	$2,291,000	$2,291,000	$2,291,000
Treatment	$7,033,000	66	$7,433,000	$7,433,000	$7,433,000
Operational research and monitoring	$842,000	8	$1,142,000	$1,142,000	$1,142,000
TOTAL	**$10,632,000**	**100**	**$11,332,000**	**$11,332,000**	**$11,332,000**

Table 4. Key strategies and estimated annual expenditures for major pests (excludes salaries, and programs for invasive plants and biocontrol)

Type of Pest	Approximate Annual Expenditure	Strategy
Bark beetles (including mountain pine beetle, spruce beetle, and Douglas-fir beetle)	$5,535,000[1]	Mountain pine beetle[2] • Treat areas where populations are manageable to either suppress the population or limit spread eastward. • Conduct an extensive salvage harvesting program. • Investigate the province-wide extent and severity of mortality to young lodgepole pine. Spruce and Douglas-fir beetle • Identify and treat (primarily harvest) new infestations before they expand.
Defoliators (e.g., western spruce budworm)	$843,000	• Protect high-value stands with aerial applications of Btk spray.
Pathogens (e.g., root diseases and Dothistroma needle blight)	$350,000	Root diseases • Encourage the use of less susceptible species during replanting on high-risk sites. • Promote the use of stump removal to reduce infection rates. Dothistroma needle blight • Monitor the incidence and impact of the disease and annually update the risk rating. • Reduce the planting of pine in high-risk areas.
Gypsy moth	$700,000	• Prevent the establishment of gypsy moth and some other exotic pests.
Other young-stand pests	< $100,000	• Monitor the incidence and impact of various young-stand pests and annually update their risk ratings.

[1] Distribution of funding varies annually among the three species of beetles.
[2] Federal expenditure on treatment of the mountain pine beetle is approximately $30 million annually.


Elytroderma needle cast


Atropellis canker


Hemlock dwarf mistletoe


Large aspen tortrix


Mountain pine beetle

Predominant Tree Species

Credit: State of British Columbia's Forests – 2004

Hemlock
Cedar
Douglas-Fir
True Fir
Spruce
Lodgepole Pine
Ponderosa Pine
Other Coniferous
Broadleaf
No Species Assigned
Alpine
Non Forest

For more information, please visit the following websites:

Forest Health
www.for.gov.bc.ca/hfp/health/index.htm

Future Forest Ecosystems of BC
www.for.gov.bc.ca/hts/Future_Forests/

Preparing for Climate Change
www.for.gov.bc.ca/mof/Climate_Change/

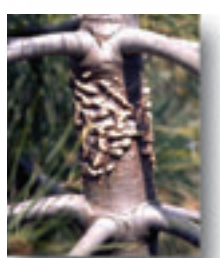
The State of Canada's Forests
http://cfs.nrcan.gc.ca/sof/latest_e.html

The State of British Columbia's Forests
www.for.gov.bc.ca/hfp/sof


Armillaria root disease


Western spruce budworm


Gypsy moth


White pine blister rust


Douglas-fir tussock moth