

FOREST PEST MANAGEMENT
ON
BRITISH COLUMBIA PARKLANDS

An Overview
of Activity and Implications
for Ministry of Forests
Pest Management Programs

by

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Forest Service Internal Report PM-PB-6

November, 1982
NOT FOR PUBLICATION

(Contents of this report may be cited only with the written approval of the
Director, Protection Branch, 1450 Government Street, Victoria, B.C. V8W 3E7.)

FOREWORD

The Ministry of Forests, as directed by Provincial legislation, has a dominant role in developing and conducting assertive pest management programs in the Province. The Ministry plans its programs so that the protection of forest resource values are integrated and coordinated with other forest land management organizations and governmental agencies. Whenever possible, expert advice is solicited and background documents are reviewed to assist in structuring these programs.

This report presents an overview of forest pest management activity on British Columbia parklands and some implications for Ministry of Forests Pest Management programs. The material presented by the author is derived from personal experience as a park planner and park forestry specialist within the Provincial park system and a knowledge of Federal, Regional, and Municipal park systems gained from agency interactions and file research.

We consider the report to be a comprehensive and objective presentation that identifies many of the complexities involved in park forest pest management. It therefore should serve to augment future dialogue and planning related to pest management problems of concern to Ministry of Forests and the various parks agencies. Comments regarding contents are welcomed.

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I INTRODUCTION

Forests pests (insect, disease, vegetation) can be categorized as organisms whose activities have undesirable impacts relative to the purposes for which forested or treed lands are managed.

Fundamental to the developing relationships between park agencies and the Ministry of Forests regarding pest management is an appreciation that each have differing management objectives. What may be perceived as unacceptable pest activity impacts from a Forests viewpoint may not be considered similarly by park agencies. Parks may perceive pest activity as aesthetically unwanted but unavoidably acceptable or as an inevitable and acceptable natural occurrence that is neither positive or negative, but instead an integral part of natural processes.

A park agency's response to a pest management problem in its forested or treed areas will be influenced by:

- the existing and potential impacts on park resource values;
- location within the park;
- type of park;
- technical nature, feasibility, and costs of control methods; and
- the management philosophy and operational capabilities of the agency.

In some situations, because of actual or potential damage to recreational or aesthetic values, control measures may be desirable. Others, even those resulting in wide scale tree mortality that would be

completely unacceptable from a commercial timber production viewpoint, may be considered as inevitable natural phenomena that are part of the forest life cycle. Such infestations can be acceptable because of their compatibility with the park management philosophy of "letting nature take its course".

Relationships between park agencies and the Ministry of Forests are further influenced by the fact that pest management activity is governed by natural parameters which transcend agency jurisdictional boundaries. Collectively, the Federal, Provincial, Regional, and Municipal parks total five million hectares in British Columbia and are dispersed throughout the province in a manner which frequently places them adjacent to lands managed for timber production and other forestry-related uses. Thus, these agencies - particularly Provincial Parks, are significant forest land managers and it is important for the Ministry of Forests, as the principal operational forest pest management agency in the province, to develop and maintain working relationships which foster cooperative approaches to pest management problems. This is particularly so as effective pest management programs will frequently necessitate inter-agency involvements in which compromises and trade-offs must be accepted by affected parties.

II BRITISH COLUMBIA PARKLANDS

The five million hectares of parkland in the Province are administered as follows:

<u>Park Agency</u>	<u>Total Area (ha)</u>	<u>No. of Parks</u>
Federal	452 000 ha	8 parks
Provincial	4 563 000 ha	340 parks, 30 recreation areas, 1 wilderness conservancy
Regional	7 600 ha	66 parks
Municipal	14 200 ha	3,000-4,000*parks

(*Estimate by author)

Considering these different park systems, an appreciation of the types of parks, their forest and treed area management purposes and practices, and their pest management capabilities should be of value in understanding pest management relationships between park agencies and the Ministry of Forests.

A. FEDERAL PARKLANDS

In British Columbia, with the exception of three small historic parks, Parks Canada exclusively manages large-area natural-feature parks - Yoho, Glacier, Mount Revelstoke, Kootenay and Pacific Rim. These large parks are managed for a variety of recreational, aesthetic and natural process objectives. Applicable forest management practices are determined within the guidelines provided by Agency natural resource management policies (1) and park-specific plans.

Policies state that "natural resources will be protected and managed with minimal interference to natural processes to ensure the perpetuation of naturally evolving land and water environments and their associated species. Manipulation of naturally occurring processes such as fire, insects, and disease may only take place after monitoring has shown that:

- i) There may be serious adverse effects on neighbouring lands; or
- ii) Public health or safety is threatened; or
- iii) Major park facilities are threatened; or
- iv) Natural processes have been altered by man and manipulation is required to restore the natural balance; or
- v) A major natural control is absent from the park; or
- vi) The continued existence of a plant or animal species, which is rare or endangered or which is critical to representation of the natural region, is threatened by a natural cause such as insects or disease; or
- vii) The population of an animal species or stage of plant succession which has been prescribed in the objectives for a park, cannot be maintained."

Where active resource management is necessary, techniques attempt to duplicate natural processes as closely as possible. Resource management in each national park considers such factors as park size, objectives, zoning, geographic location, and the nature of activities occurring in surrounding areas.

Parks Canada has a staff capability adequate to deal with pest management problems in their initial stages and utilizes the specialized detection, monitoring, assessment, and scientific expertise of the Canadian Forestry Service establishments at Edmonton and Victoria.

B. PROVINCIAL PARKLANDS

The provincial park system is managed by the Parks and Outdoor Recreation Division (PORD) of the Ministry of Lands, Parks, and Housing. It includes a diverse collection of parks ranging from Peace Arch Park - a nine hectare horticulturally managed park, to Tweedsmuir Park - a 981 000 hectare wilderness park. With the exception of several special-purpose parks, the 371 parks and recreation areas are mainly forested areas managed primarily for a combination of recreational, aesthetic, and natural process objectives.

Consumptive utilization of natural resources for commercial purposes is strictly regulated by the Park Act (2) and Park Act Regulations (3) which define park classifications and set out statutory and regulatory provisions regarding natural resource management. Applicable forest management practices are determined within the guidelines provided by a combination of the statutes, park master plans, certain natural resource management policies, and an agency tradition based on "let nature take its course" in natural areas.

Outside developed areas, the forest cover management objectives emphasize natural processes and aesthetic values. Control actions directed at limiting the occurrence of large-scale insect infestations are considered only when park values and/or forest values on adjacent lands are threatened by potentially unacceptable disturbances. For example, management practices have attempted suppression of almost all wildfire.

On areas within and adjacent to park developments, the forest cover is managed for aesthetic purposes with the objective of maintaining recreational values. Management practices include fire suppression and the removal of dead, diseased, and infested trees which constitute a threat to public safety and/or the health of adjacent forest cover. Control measures intended to limit growth of undesired vegetation in specific areas and the spread of "noxious weeds" have been occasionally undertaken to efficiently maintain recreational and aesthetic values or to accommodate other resource agency management objectives.

The Parks and Outdoor Recreation Division has a staff capability that can deal with pest management problems in their initial stages. Assistance is usually sought from the Ministry of Forests and/or the Canadian Forestry Service in the areas of detection, monitoring, assessment, and scientific pest management.

C. REGIONAL PARKLANDS

Currently, there are 14 Regional Districts managing park systems in the province. Parks range in size from under one hectare to 1 500 hectares. For a greater appreciation of Regional District park systems, see portions of the Municipal Act (4) pertaining to regional parks and the Regional Park Act (5). These parks generally have a natural forest cover which is managed for aesthetic, recreational, and natural process objectives. They tend to be located at the urban/country interface and do not abut lands managed for timber production purposes as frequently as Federal or Provincial parklands.

Unlike parks managed by the senior levels of government where a single organization is involved, Regional parks are managed by separate agencies - each Regional District having a differing-sized park system and varying management operational capability. In dealing with forest pest management problems, it is likely that all Regional Districts would desire specialized pest management advice and many would require financial and/or operational assistance. However, due to these parks' locations and smaller sizes, their involvement in forest pest management situations is correspondingly less than federal or provincial parks.

D. MUNICIPAL PARKLANDS

Municipal parklands, by virtue of their small size, urban location, general absence of significant areas of natural forest cover, and emphasis on individual tree management, do not normally encounter forest pest problems that would have implications for Ministry of Forests programs. Exceptions to this could be park systems with large forested areas, e.g. Vancouver - Stanley and Central Parks, smaller communities where parks may have more portions of natural forest cover and may be inclose proximity to commercial forest lands, and the rare occurrences where the introduction of an exotic pest is involved, e.g. European pine shoot moth or Gypsy moth.

In dealing with forest pest problems, municipal park agencies would more likely draw on arboricultural expertise, and then seek management advice from agricultural or forestry sources. For most situations, they would usually have an operational capability sufficient to deal with

small scale problems. Due to the horticultural nature of their parks, they may be able to more readily employ chemical controls. The number of pesticides registered for ornamental use is greater than for forestry purposes and because their use has been generally accepted there is less potential for public controversy.

III PREVIOUS PEST MANAGEMENT PRACTICES IN PARKLANDS

Parkland forest pest management practices have a long established history in this province. Control actions then, as now, were undertaken when park values associated with treed areas and forest stands were considered to be unacceptably threatened. Methods used reflected the pest management "state of the art" during the period they were employed, the operational capabilities of the agency, and its management philosophy.

Although instances referred to in this section are those where control actions were undertaken, it must be emphasized that the majority of instances were where forest pest activity levels did not necessitate control actions. Unlike the current situation, where there is a developing recognition of the need for coordinated pest management programs, park managers (like their timber production managerial counterparts) usually conducted pest management control actions solely to protect and maintain their own agency resource values.

A. FEDERAL PARKLANDS

Amongst parklands in the province, Federal lands have a relatively long history of forest pest management, probably due in large part to the Parks Canada long time association with the Canadian Forestry Service. The Federal forestry research establishments at Calgary (later Edmonton) and Vernon (later Victoria) have provided National Parks managers with comparatively good detection, monitoring, and scientific management information on forest pests. Thus many of their decisions opting for control or no control have been based on technical rather than philosophical reasons. These properly incorporated available forest entomological and pathological advice, and often became dual purpose as the park pest activities were utilized for research by the Federal forestry scientists, thereby significantly contributing to the background for Canadian expertise on pest matters.

Some examples of past pest management activities include:

1) Kootenay National Park - Mountain Pine Beetle (6)

Large-scale infestations were first noted in 1930 and continued at varying intensities until 1945. Apparently no major control measures were undertaken during the 1930's. This may have been influenced by a severe winter in 1935 which significantly reduced pest activity until 1939 when it regained former levels. In 1942 removals were undertaken on a scale sufficient to warrant sawmilling. An infestation occurred in adjacent Banff National Park commencing in 1940. Possibly this was connected to the Kootenay Park activity but there was no substantiation of beetle migration between the two park areas. Control programs were undertaken in Banff Park during the next three years utilizing "cut and burn" methods. The total number of trees treated approached 20,000.

2) Yoho National Park - Mountain Pine Beetle (6)

Control measures were undertaken during 1945/46 for a large beetle infestation on lodgepole pine. "Cut and burn" methods similar to those used in Kootenay and Banff parks were employed, with about 8,000 trees being treated.

3) Banff and Jasper National Parks - Mistletoe (7)

Mistletoe infestations on lodgepole pine in campgrounds were treated by pruning programs in Banff in the early 1960's and in Jasper in the late 1970's. The objectives were to minimize deterioration of aesthetic values in the campgrounds and thereby ensure the future recreational utility of these facilities.

4) Pacific Rim National Park - Root, Butt, and Stem Diseases (8)

In a campground area, removals of large sitka spruce, western hemlock, and western red cedar structurally weakened by decay-producing fungi were undertaken during 1971 for public safety reasons.

B. Provincial Parklands

No information has been obtained during the course of this review on forest pest management activities prior to 1957 when provincial parklands were administered by the then, Parks Division of the Ministry of Forests. After 1957, Parks became a separate agency within the newly formed Ministry of Recreation and Conservation, solely responsible for development and implementation of its own policies and practices under the provisions of the Park Act.

With this statutory guidance (Park Act, Sections 5-3, 9-1 and 9-2, and 12 pertain to the preservation of natural environments, the protection of natural resources, and the categories of parks) and a tradition of "letting nature take its course" derived from a combination of natural area management philosophy plus a chronic shortage of resources (funding, staffing and expertise) for natural resource management, relatively few pest management problems resulted in active control measures. As in the case of the National Parks, actions were taken only when park values were considered to be unacceptably threatened. Advice and assistance was usually sought from the Canadian Forestry Service, the Ministry of Forests, or other forestry sources. Some examples of past pest management activity include:

1) MacMillan Park (Cathedral Grove) - Pine Butterfly (9)

An outbreak of pine butterfly on Douglas-fir occurred in 1959. After a third consecutive year of serious defoliation in the park and adjacent stands owned by MacMillan Bloedel Ltd., a cooperative aerial spray program was undertaken to apply DDT over the infested area, excluding an area at the mouth of the Cameron River.

2) MacMillan Park (Cathedral Grove) - Douglas-fir beetle (10)

In 1976, moderate to high beetle populations were observed by Canadian Forestry Service staff in windfelled trees along the western park boundary on MacMillan Bloedel lands adjacent to a newly constructed logging access road. On advice from CFS, infested trees and logs were removed by the Company to prevent further attacks on adjacent standing Douglas-fir on Company lands and in the park.

3) Skihist Park - Mountain Pine Beetle, Western Pine Beetle,
Turpentine Beetle, Ips. Bark Beetles. (10)

The removal of 26 bark beetle infested ponderosa pine was conducted in the day-use picnic area during 1979 to prevent further attacks on individually valuable trees. Another 38 infested pine were removed from the campground during the next year to prevent further losses in that area.

Discontinuation of irrigation in the picnic area and disturbances due to septic field installations in the campground area pre-disposed the trees to attack.

4) Bowron Lake Park - Spruce Beetle (10)

In 1975 a large area of blowdown occurred over 600 hectares of spruce stands within the park. Similar and larger areas of spruce windthrow occurred over a wide-scale area outside the park. Commercial forestry interests repeatedly requested the Park Agency and the Government to salvage log the park blowdown, citing the danger of a spruce beetle epidemic resulting from a population buildup in the windthrow as a major reason for taking action. However, monitoring of beetle populations during the next 4 years by Canadian Forestry Service staff indicated low to moderate population levels that did not pose an unacceptable threat to spruce stands within or outside the park. Their monitoring also indicated that population levels in some blowdown areas outside the park were higher and therefore posed potentially

greater threats. As the windthrown spruce gradually died over a 3 to 4 year period, the 1975 park blowdown area became less attractive for beetle brood production and became an insignificant source of further spread of the insect.

Good!

5) Goldstream and Sproat Lake Parks - Phellinus (Poria) Root Disease (10)

Tree failure problems due to structural weakening of Douglas-fir root systems in the campgrounds of both parks necessitated removal of 500 trees at Goldstream in 1978/79 and 430 trees at Sproat Lake in 1979/80. These operations incorporated forest pathological practices and led to the development of management guidelines (11) for systematically controlling what had been a sporadic but continuing tree hazard/public safety problem in these parks and others within the provincial system.

*Paranoia
over pathology
law suits*

6) Manning Park - Western Spruce Budworm (10)

An extensive infestation of western spruce budworm occurred in the Pemberton Valley, Fraser Canyon, and Hope - Skagit River areas beginning in 1969. In 1973 defoliation was noted at the western boundary of Manning Park. By 1976 the infestation had reached the point where the Ministry of Forests was contemplating a control program to reduce both growth rate and form losses and avoid possible mortality. Preparations were made in 1977 to undertake an aerial spray program over approximately 40 000 hectares - one-fifth of the

infested area. The position of the Parks Branch regarding the defoliation and tree damage within Manning Park was that it primarily represented undesirable but acceptable short term aesthetic damage. Control could not be justified in terms of park forest values unless large-scale mortality occurred which threatened other park values, e.g. loss of overstory at Rhododendron Flats with subsequent endangerment of the rhododendrons. If the Hope - Skagit River portion of the infestation was selected for control, treatment of the adjacent portion inside the park would have become entomologically desirable to prevent re-invasion. However, another portion of the infestation was selected for treatment by the Forest Service, thereby avoiding the necessity of the Park Agency deciding whether or not to participate in the control program on a "good neighbour" basis. The ensuing public controversy surrounding the proposed aerial spray program and the subsequent collapse of the budworm population prevented the issue from recurring.

C. REGIONAL PARKLANDS

The first Regional District park system became operationally active in 1972. No information was obtained during this review to indicate any significant forest pest control practices, probably due to these park systems limited size and recent establishment. The longest-established and most developed systems - The Greater Vancouver Regional District

(GVRD) and the Capital Regional District (CRD), have taken actions on an individual tree basis. In the case of the GVRD system, expertise was obtained from the District's watershed forestry staff and a forestry consultant. CRD have obtained advice from the Canadian Forestry Service and the Ministry of Agriculture and Food regarding defoliation caused by the winter moth.

D. MUNICIPAL PARKLANDS

Municipal park management has a long history of pest management arising from horticultural practices carried out to maintain aesthetic values of ornamental vegetation. Instances of control measures conducted against forest pests have also occurred.

Some examples of past pest management activity include:

1) Stanley Park (City of Vancouver) - Western Hemlock Looper(9)

During the late twenties, a number of intensive but localized infestations occurred in the Lower Mainland in predominantly hemlock stands. After serious defoliation in 1929 in Stanley Park, the Vancouver Parks Board, concerned about concurrent severe defoliation and subsequent mortality on the adjacent North Shore, agreed to an aerial dusting project in 1930 to prevent further defoliation and possible mortality within the park. Operations were carried out under the advice and direction of the Dominion Entomological Branch. The aerial dusting involved application of a calcium arsenate hydrated lime mixture at 20 lb/acre. Ground spraying of hemlock in the highly used recreational areas was also undertaken utilizing lead arsenate at 2 lb/40 gal of water.

Another control operation was carried out in 1959 when hemlock looper and green-striped forest looper had reached the point where defoliation seemed likely to cause top killing of the larger hemlock trees in the park. The infested areas were aerially sprayed with 10% DDT in fuel oil applied at 1 U.S. gal/acre.

2) Kelowna and Vernon - European Pine Shoot Moth

European pine shoot moth, initially detected in the province at Victoria during 1927, established itself over the years as a pest on horticultural pines on the Coast. First detections in the Interior were in 1961 on ornamental pines. Further new recordings at Interior locations in the next few years resulted in provincial quarantine regulations prohibiting movement of infested pines from the Coast to the Interior. These actions were taken cooperatively by the Ministry of Agriculture and Food and the Ministry of Forests in response to concerns over potential damage to horticultural nursery stocks, urban pine plantings, and Interior native pine stands. Intensive surveys, supported by Ministry of Forests operational funding and personnel, were conducted to detect and treat infested pines in the Okanagan Valley communities. While the pest was of concern to municipal park managers and others engaged in urban tree management, the population

appeared to remain static at a very low level with no indication of movement and outbreak onto native pine stands. As a result, in 1981 the costly urban tree surveys were discontinued.

IV CURRENT PEST MANAGEMENT PRACTICES IN PARKLANDS

Pest management practices on parklands today reflect the same basic objectives as those of the past - the protection and maintenance of aesthetic and recreational values associated with treed and forested areas. However, with the increasing awareness of the need for inter-agency consultation and cooperation in resource management, the necessity for similar cooperation in forest pest management problems is being recognized by park managers - notably the Federal and Provincial Agencies. A prominent expression of this trend is the Interagency Committee on Mountain Pine Beetle - a group that now includes representation from Federal Parks and B.C. Provincial Parks in addition to the Alberta Forest Service, B.C. Ministry of Forests and the Canadian Forestry Service. Other examples are recent park-specific cooperative endeavours between Park Agencies, Ministry of Forests, and the Canadian Forestry Service.

A. FOREST PESTS OF CURRENT CONCERN

The activities of the following pests and diseases have resulted in the consideration of and/or implementation of management actions by park managers:

Table 1. Forest insects and diseases at current concern to park managers

PEST ORGANISM	FEDERAL PARKS	PROVINCIAL PARKS	REGIONAL PARKS	MUNICIPAL PARKS
Bark Beetles				
Mountain pine beetle	x	x	x	x
Spruce beetle	x	x	x	
Douglas fir beetle		x		
Defoliators				
D. fir tussock moth		x	x	x
Gypsy moth				x
Winter moth			x	x
European pine shoot moth		x	x	
Root & Butt Diseases				
<u>Phellinus, Armillaria</u>	x	x	x	x
<u>Fomes, Polyporus spp.</u>	x	x	x	x
Stem Diseases and Cankers				
<u>Echinodontium, Fomes</u>	x	x	x	x
<u>Ceratocystis spp.</u>	x	x	x	x

The following examples involving the Provincial Park System should serve to illustrate factors which have implications for Ministry of Forests programs. Each description is preceeded by a heading defining primary and secondary objectives for management action. The texts sequentially capsulize events and the factors and procedures involved in decision-making. One example - the Manning Park Eastgate mountain pine beetle infestation, is described in greater detail in the Appendix so the reader may more fully comprehend the complexities involved in the management of a serious forest pest problem within a park.

B. CURRENT FOREST PEST MANAGEMENT EXAMPLES

1. Top of the World Park - Spruce Beetle

Primary management objective - protection of adjacent
commercial forest values

Secondary management objective - protection of park
forest values.

- a. Ministry of Forests staff, Nelson Region, during 1981 routine pest detection and monitoring surveys, discovered a small spruce beetle infestation inside the park located adjacent to spruce stands managed for timber production purposes. In November 1981 discussions with Parks and Outdoor Recreation Division (PORD) East Kootenay District and later with PORD Kootenay Region, a proposal was made to attempt control utilizing a lethal trap tree program. Grounds for this proposal presented by the MOF were that the infestation constituted a threat to the adjacent commercially managed spruce stands and to the control efforts already completed or contemplated outside the park. Also, spread of the infestation could potentially impair park values. MOF offered to provide technical assistance and operational funding. The control actions recommended involved felling of monosodium methane arsenate (MSMA) treated trees within the park during 1982 and 1983.
- b. Since the project involved cutting trees in a park and the use of a chemical pesticide, both potentially publicly sensitive

issues, PORD Kootenay Region sought Ministry of Lands, Parks and Housing Executive Committee approval to issue a Letter of Authority allowing MOF staff to undertake control action. The original submission by Kootenay Region emphasized good neighbour grounds as management justification, not the threat to park values. PORD Headquarters required a change in the submission to reflect the importance of the threat to park values and to point out that PORD wished MOF to undertake this work inside the park for preservation and conservation of park values.

- c. Ministry of Lands, Parks and Housing Executive Committee approved the proposal and the PORD Assistant Deputy Minister then formally requested assistance from MOF. Assistance was confirmed by the MOF Deputy Minister and PORD then issued Letter of Authority to MOF Nelson staff to undertake the program commencing in April, 1982.

2. Manning Park - Mountain Pine Beetle

Primary management justification - Dual concerns regarding protection of commercial timber values on adjacent lands and park forest values.

This case history is outlined in detail and, because of its length, has been included in the Appendix.

3. Stemwinder and Bromley Rock Parks - Douglas-fir Tussock Moth

Primary Management objective - protection of park forest and recreational values

- a. In early June, 1981, MOF Kamloops Region advised PORD Thompson/Okanagan Region of outbreaks of Douglas-fir

tussock moth in the Similkameen River Valley and that both Bromley Rock and Stemwinder Parks were affected. Information was provided on the nature of the outbreaks - severe defoliation, some mortality, and an allergenic reaction by approximately 20% of the people who come in contact with the larvae or caterpillars.

- b. After consultation with PORD Thompson River District and further discussion with MOF Kamloops Region, PORD Thompson/Okanagan Region decided that a control program to protect recreational and aesthetic values was necessary. The PORD Assistant Deputy Minister and the Lands, Parks and Housing Deputy Minister were advised of the situation and after their concurrence with the recommended course of action, permit applications were made in February 1982 to ground spray portions of the parks using Orthene^R(acephate).
- c. The Pesticide Control Branch, Ministry of Environment, issued permits in May 1982 and spraying funded by PORD Thompson - Okanagan Region took place in early June. Spraying operations conducted against some Douglas fir tussock moth infestations located on private lands were conducted under the auspices of the Regional Districts financed by a MOF contribution of \$100,000. The Ministry also conducted limited operational trials on selected infestations on Crown Lands under its jurisdiction.

4. Carp Lake Park - Spruce Beetle

Primary Management objective - protection of commercial timber values on adjacent lands and protection of park forest values

- a. In March, 1982, Ministry of Forests, Prince George Region, requested Parks and Outdoor Recreation Division, Omineca/Peace Region, to consider control actions for small infestations of spruce beetle along the southern boundary of Carp Lake Park. As a result of logging adjacent to the park boundary, small pockets of windthrow had occurred just inside the park. These were subsequently infested by spruce beetle, thereby posing a threat to adjacent standing spruce in and out of the park.

Observations of other spruce clearcuts on the Nechako Plateau and on areas between Prince George and Carp Lake noted blowdown along their northerly boundaries, presumably due to southwesterly winds. Thus, logging activities seemed to be enhancing conditions for spruce beetle activity because of the difficulty in leaving windfirm boundaries.

- b. In June, 1982 after a joint field inspection by MOF and PORD staff, a number of management options were identified. In July, after a further meeting between MOF and PORD District staffs, MOF Prince George West District wrote PORD Omineca/Peace Region recommending an option which would see a self-financing salvage

operation undertaken by a logging company that would take infested trees plus enough additional standing timber in the park to cover all costs.

- c. PORD Omineca/Peace Region, lacking funding necessary to confine operations to infested trees only, responded favourably to this option and sought approval from PORD Assistant Deputy Minister and agreement from PORD Resource Management. The latter responded with a proposal for logging infested and blowdown areas only, financed under the Federal/Provincial Emergency Bridging Assistance Program. No decision had been reached at the time of writing this report (October, 1982).

V IMPLICATIONS FOR MINISTRY OF FORESTS PEST MANAGEMENT PROGRAMS

As the major operative forest pest management agency in the Province, the Ministry of Forests often becomes involved in pest management on lands outside its direct jurisdiction. While justification for doing so might be viewed only in terms of achieving Ministry pest management goals, from a provincial resource management perspective, involvement by the Ministry in this manner would seem justified for reasons of cost effectiveness. Having one agency like the MOF, which is developing this highly specialized management capacity for its own requirements, provide assistance to other agencies that are not and probably never will be self-reliant in this discipline, seems fundamental. Indeed, statutory provisions for these involvements are contained in the Forest Act. Sections 125 and 126 provide for unilateral control actions by the Ministry and Sections 127 and 128 permit the Ministry to enter into agreements for control.

Assuming the Ministry continues to develop as the principal forest pest management agency, a long-term requirement will be to accommodate management objectives of other agencies in a province-wide pest management program. Where parklands are concerned, there are three basic reasons why forest pest management activities will necessitate involvement by Ministry of Forests.

First, is simply the amount of parkland and its location. Parklands, particularly provincial parks, contain large areas of forest and are situated throughout the province in a manner that results in inevitable interactions with Ministry of Forests programs.

Second, and the feature of greatest significance in pest management, is the particular nature of park forest management. Park trees and forests are managed for a combination of recreational, aesthetic, and natural process objectives. Managing trees and stands for recreationally aesthetic purposes ultimately results in trees of advanced ages, since people's aesthetic preferences tend toward size and visual character - both characteristics exhibited by older trees and stands. Unfortunately, trees and stands become more susceptible to pests as they age.

In dealing with the phenomena of increasing pest susceptibility with age, park forestland managers cannot readily utilize the timberland management techniques of pre-emptive harvesting and shortened rotation ages due to their visual and philosophical incompatibility. Instead, the interactions of natural elements - wind, fire, insects, and disease are theoretically relied upon to induce a continuing process of forest renewal. In application, intervention, e.g. long-term fire suppression, occurs when impacts of an element are considered unacceptable to park and/or adjacent land objectives. (A subtle effect of the fire

*nature
seems
to do
a good
job of
it.*

intervention example is a furthering of forest age and resultant pest susceptibility beyond that which would take place under natural conditions).

A complicating factor faced by park managers is that short^{-term} visual characteristics of forest renewal, either by natural elements or by large scale-tree removal interventions (logging) are often perceived adversely by a predominantly urbanized park clientele. Individual situations can be further complicated when the park or zones within it are intended or, due to limitations of park agency natural resource management capability, perceived to be managed under a "let natural processes occur unimpeded" philosophy. *only when fires are prevented*

The third reason relates to the limited forest management capability of park agencies. Like other smaller government agencies which manage forested lands, park agencies cannot justify development of a specialized staff capability necessary for effective in-house forest pest management programs and therefore must necessarily request technical expertise and operational assistance from outside sources - Ministry of Forests and the Canadian Forestry Service.

Implications for Ministry of Forests pest management programs resulting from parkland forest pest activity can be categorized under the following headings:

1. Management Objectives

Ministry of Forests and Park Agency forest management objectives are different and as a result their responses to pest activity may not be the same. In these situations, an understanding and acceptance of each other's objectives seems pre-requisite before mutual pest problems can be assessed and treated.

Implication:

An understanding and acceptance of park forest management objectives should be developed by MOF pest management and other staff from the Ministry who interact with parks personnel on resource management matters. Park trees are not part of the annual allowable cut! If timber is produced in commercial quantities, it must only result from some other park management objective. Timber production has not been, with the exception of past special circumstance land/timber exchanges in certain Class B Provincial Parks, a primary objective. On the other hand, park staff involved in pest management decision-making should clearly comprehend the values at risk on lands adjacent to parks.

An appreciation of the differing objectives is now being achieved by staff interactions at the District, Regional, and Headquarters levels. Formal statements and interchange of forest management objectives, particularly pest management policies would assist this process.

2. Management Practices

a) Parks Jurisdictions

Park forest management objectives ultimately tend to result in older trees and forests that become subject to increased pest activity. While the occurrence of such activity might not be undesirable from the park managers viewpoint, the prospect of park-generated pests spreading onto adjacent forest lands is a legitimate concern on the part of neighboring forest land managers.

Implication:

Ministry of Forests pest management programs inevitably will be affected to some degree by park forest pest management practices. Providing timely assistance and advice to park managers on pest problems will be mutually beneficial to both MOF and Parks interests.

b) Timber Production Jurisdictions

Forest pests can also move from timber production lands into parks. Generally such occurrences are the result of natural factors, but some can result from practices used on timberlands, e.g. logging at a park boundary, resultant windthrow inside the park, and the development of a bark beetle population that threatens park forests and/or other adjacent forest values. The Carp Lake spruce beetle activity and the Douglas-fir beetle activity at MacMillan Park are examples where timber harvesting activity created conditions that threatened park forests values.

Implication:

Just as the park agency has a responsibility to not unduly endanger forest values on adjacent forest lands, so do adjacent timber production land managers to not unduly endanger park forest values.

3. Perceptions:

Like forest management, park management is critically viewed by the public. Forest pest management practices in parks involving significant tree removals, extensive applications of pesticides, or similar high-profile activities are vulnerable to public misinterpretation. Park managers must have access to adequate technical pest management information and expertise to be able to publicly present and defend controversial decisions.

Due to this potential for public controversy, park agency pest management decision-making will frequently require review or participation by the agency's executive. What to Ministry of Forests personnel may appear to be a relatively routine pest management project may, within a park agency, be perceived as being so sensitive that a Ministerial or public Park Board approval is required.

Implication:

Ministry of Forests personnel should recognize these factors of public sensitivity and high-level adjudication when developing and submitting proposals for pest management programs involving parks. Thorough documentation may be required from MOF staff by park managers for justification to both their executive and a critical public. Without this level of information, participation in control projects almost become "acts of faith" on the part of the park managers - a situation they should not have to accept. For an example of complexities involved in park forest pest management decision-making, refer to the Appendix.

4. Technical:

Park agencies do not have forest pest management specialists on staff. At best, they will have a forest management generalist. Thus, the specialized pest management expertise of the Ministry of Forests and the Canadian Forestry Service will usually be sought in most park pest management problems.

Implication:

Ministry of Forests pest management staff by virtue of their field presence will increasingly become more involved in provision of technical pest management expertise to park managers. It is likely that Canadian Forestry Service staff will continue existing involvements, e.g. Parks Canada and the Forest Insect and Disease Survey, and become more utilized as a source of expertise for specialized problems and as an independent, objective voice in situations where parks managers desire opinions in addition to those from the Ministry of Forests.

5. Operational:

Ministry of Forests pest management capabilities are currently and will continue to be utilized by park managers. Detection and operational assessment surveys carried out by Ministry of Forests staff within parks have already taken place, as have control measures such as lethal trap tree programs. In many situations, the park agency will not have the capability to undertake operational phases of a pest management project.

Implication:

Ministry of Forests, on occasion, will be requested to carry out all or portions of the operational phases of park pest management projects. Cooperation with parks operational staff will result in an improved park agency capability but it is unlikely that they will ever become completely self-reliant.

6. Financial:

Financing of pest management programs is inherently difficult because biological factors make prediction of activity levels uncertain. In the case of park systems, intermittent forest pest problems cause funding requirements to be irregular or non-existent. Because of these factors, the budgetary contingency fund is a convenient tool. Unfortunately, in these days of planned programmed budgetting, inclusion of contingency funding seems less feasible.

The Ministry of Forests, with its established pest management programs, operates on a scale large enough to retain a degree of flexibility that allows it to respond to unexpected problems. This is usually not the case for parks organizations where pest control projects, if they are required, must be budgetted one to two years ahead or funds taken from other current-year projects.

Implication:

Unless given one or two years lead time, park agencies will not usually be in a position to fund large-expenditure pest management projects. It is likely that external funding, e.g. from Ministry of Forests, will be required in many pest management projects involving parklands. Provisions of the Forest Act do provide for agreements between the Ministry of Forests and other parties in order to implement pest control projects. (See reference No. 12, Sections 127, 128).

7. Training:

As park agencies seldom employ forest pest management specialists, their staff must seek technical assistance from Ministry of Forests and Canadian Forestry Service. Needs may range from basic recognition, identification, monitoring, and assessment, through to management prescriptions, operational prevention, or control measures.

Implication:

Inclusion of park agency personnel in pest management workshops and short courses put on by MOF and CFS would serve to improve the general expertise of park agency staff. (This has already taken place in some mountain pine beetle and root disease workshops). Over time this may reduce assistance needed in such basic areas as recognition, identification, and monitoring.

8. Decision-Making:

Given the potential public sensitivity, park managers and Ministry of Forests staff appear at times reluctant to become involved in park forest pest control. For example, park managers may be hesitant in undertaking operations involving large-scale tree removals for fear of such actions being perceived by the public as "logging the parks". Similarly, Ministry of Forests staff could be reluctant about direct involvement for fear that the public may perceive them as "logging the parks" or "pressuring" the parks agency to permit logging. This reluctance or apprehension is not eased by the situation for many large parks where an absence of detailed resource inventories makes pest impact assessments difficult.

Implication:

Apprehension with forest pest management on the part of staff in both agencies can result in a complicating or time-consuming escalation of the decision-making level. It must be accepted that in parks, some pest control operations are publicly sensitive, e.g. extensive logging or aerial application of chemical pesticides, and that their implementation may ultimately be decided upon at the political level. However, these should be distinguished from the smaller-scale problems where early discovery and prompt action can avoid the need to employ controls that are publicly controversial due to scale or technique. Development of specific pest management policies and procedural guidelines by Parks and the interchange of same with the MOF could be beneficial in resolving pest management in their early stages by clarifying agency policies and distinguishing decision-making levels.

VI SUMMARY STATEMENT

Forest management is a diverse endeavour in which forested lands are managed to satisfy a variety of social needs. While the predominant objective in most forested areas may be production of timber and related products, certain forest areas are managed specifically for non-consumptive purposes. Parks are the most conspicuous of these.

*it should not
be though*

Park forest management differs from conventional commercial forest management in that its objectives are exclusively associated with recreational, aesthetic, and natural process values. Park management responses to pest activity can be different and in certain instances, contrary to those expected by timber production managers.

Park agencies, particularly federal and provincial, are gradually implementing improved levels of forest management. At this time, efforts in pest management are generally reactive, guided by certain philosophical objectives that have yet to be uniformly and consistently applied in the form of management programs.

The Ministry of Forests is charged with planning the use of forest resources under its jurisdiction in a manner that is coordinated and integrated with other Ministries and agencies of the Crown and with the private sector, see Section 4c, Ministry of Forests Act (13). Thus, there are statutory requirements for the Ministry to become involved with other land management agencies. In the case of pest management, the nature of forest pest activity inevitably dictates involvement with other forest land management agencies such as parks.

Given the objectives of park forest management, the potentially differing responses to pest activity, and the specialized nature of pest management, there will be a continued need for involvement by the Ministry of Forests. It is likely that the Ministry will always be perceived by park forest managers as a source of technical, operational, and financial assistance in pest management matters.

An understanding and appreciation of park agencies' forest management objectives will assist the Ministry of Forests in developing coordinated and integrated forest pest management programs. Hopefully, this report will further that understanding and improve the level of cooperation in pest management between the Ministry and park agencies.

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VIII APPENDIX

Manning Park - Chronology of Events Concerning Pest
Management Measures for the Eastgate
Mountain Pine Beetle Infestation

Manning Park- Chronology of events concerning pest management measures for the Eastgate mountain pine beetle infestation.

1. During the summer of 1980, staff of the Ministry of Forests (MOF) Princeton District and the Canadian Forestry Service (CFS) Forest Insect and Disease Survey (FIDS) Victoria, became concerned over the presence of two small infestations of mountain pine beetle along the highway just inside the park at Eastgate.
2. MOF Princeton District on August 5, 1980, wrote Parks and Outdoor Recreation Division (PORD) Manning District advising of the necessity to undertake control action and provided explanatory information on the mountain pine beetle, control methods, and its potential impact.
3. After discussions with PORD Manning District, PORD Lower Mainland Region, wrote PORD Victoria Directors on September 3, 1980 informing them that the Region's decision was to undertake no action since proposed control measures could give no guarantee of the elimination or even significant reduction in the beetle attacks or the prevention of their reoccurrence. The letter requested concurrence with this decision and comments from Victoria-based PORD Resource Management staff.
4. PORD Resource Management, Victoria, requested CFS-FIDS, to make a more detailed check of situation at the Park.
5. MOF Pest Management, Kamloops Region, contacted PORD Resource Management inquiring about the PORD position on control. Resource Management indicated difficulties of undertaking control action of this scale and pointed out that the absence of forest cover mapping for the park made the vulnerability of the park forest cover along highway the subject of informed speculation not hard data (MOF forest inventory program didn't cover the park). MOF Kamloops/Vancouver Region advised they would attempt to provide forest cover data.

6. CFS-FIDS, undertook a detailed examination of the infestation September 22 and 23, 1980 and reported October 3, 1980 that potential for spread along highway was high because of the pine's susceptibility.
7. Later in October, PORD Resource Management staff prepared a detailed analysis of situation for PORD Lower Mainland Region outlining management options and the consequences of:
 - a) Doing nothing
 - b) Undertaking limited control when infestation reaches park developments
 - c) Undertaking immediate control.

The analysis recommended that the MOF be requested to assist in providing forest cover mapping which would allow detailed evaluation of the infestations potential impact on park forest cover. If this mapping confirmed the informed speculation regarding vulnerability, then option (c) should be considered with operational and financial assistance requested from the MOF. The report was sent to PORD headquarters directors and the Lower Mainland Region October 17, 1980.

8. MOF Pest Management Kamloops prepared a forest cover map from 1979 Dept. of Highways aerial photos and forwarded it to PORD Resource Management in mid-January. The map was reviewed by Resource Management and Victoria Director I/C and a copy forwarded to PORD Lower Mainland Region. Indication by MOF to PORD Resource Management at time of map-forwarding was that the control matter would be raised again at a Regional level.
9. PORD Lower Mainland Region informed PORD Resource Management on February 6, 1981 via phone that the Region's decision was not to undertake control measures and that MOF Princeton District had already been informed of this decision.

10. MOF Vancouver and Kamloops Regions arranged a meeting at Manning Park, April 21, 1981. Attending for MOF were District staff, Regional Managers, and Headquarters Protection staff. Representing PORD was District staff, Regional Director, and Headquarters Resource Management staff. An exchange of forest management philosophies and pest management strategies took place. The Eastgate infestation was inspected as well as control operations on adjacent MOF lands. No changes regarding the decision on management measures within the park resulted.
11. MOF Kamloops Regional Manager on April 28, 1980, wrote PORD Resource Management summarizing MOF concerns about the potential impact of the infestation inside and outside park. A copy of the MOF letter was sent by Resource Management to PORD Lower Mainland Region for recommendations regarding control action.
12. PORD Lower Mainland Region responded to PORD Resource Management via telephone, repeating that control by logging was not acceptable because no guarantee of success, inconsistent with park management philosophy of letting nature take its course, and would be difficult to defend publicly. They suggested continued monitoring and more research into alternative treatment, e.g. use of pheromone attractants for containment. The Resource Management Manager concurred and a reply to that effect was sent to MOF Kamloops Regional Director. The latter responded re-emphasizing the potential hazards and offering to assist in any way.

13. In June and July, PORD Vancouver Region, in cooperation with PORD Resource Management, MOF Vancouver Region, and Simon Fraser University (SFU) Pestology Centre staff, undertook infestation monitoring and chemical attractant measures. Resource Management wrote MOF Vancouver suggesting a meeting in September to review the success of chemical attractants and results of the summer beetle flight. PORD Lower Mainland Region concurred.
14. September 1981 surveys by CFS revealed the infestations at Eastgate had roughly tripled in size. MOF Vancouver, in cooperation with PORD Manning District, and British Columbia Institute of Technology (BCIT) students undertook a detailed field survey of the area to determine the exact extent of current infestations.
15. MOF Vancouver Region assembled survey data on the infestation's current size and retained the services of a former CFS entomologist to evaluate the results and recommend management measures. Results of the chemical attractants were reviewed with SFU participants. The findings that the chemicals had been successful as attractants but in this application had not been an effective containment plus the survey results showing a total of approximately 5,000 attacked trees were presented to PORD Lower Mainland and Manning staff in October, 1981. MOF Vancouver Region then flew personnel from each PORD location to Carpenter Lake for an on-site look at an area subject to an uncontrolled mountain pine beetle infestation.

16. PORD Lower Mainland Region and Manning District after review of the recent information on the infestation size increase, limitations of containment by chemical attractants, and potential damage to recreational values along the eastern part of the highway corridor and to the aesthetics adjacent to major park development, decided that control measures via logging of infested trees were required and sought PORD Executive approval for implementing an infested-tree removal control program utilizing financial assistance from MOF.
17. On November 5, 1981, the Lands, Parks and Housing Deputy Minister requested a report on situation. The matter was then placed on Ministry Executive Committee agenda. PORD Lower Mainland Region and Manning District prepared a slide tape and report for presentation at the next meeting.
18. Ministry of Lands, Parks and Housing Executive Committee met January 27, 1982 in Vancouver and received the presentation by PORD Lower Mainland Region and Manning District staff on the infestation. A decision was made to undertake control action in the park.
19. On Jan. 28, the Minister of Lands, Parks and Housing was advised of the details of control operation proposal and his approval obtained.
Justification presented to the Minister was:
 - a) Values threatened by infestation are of recreational and scientific nature, control measures seek to preserve and manage these (complies with provision of Park Act regarding protection of natural resources).

- b) Infestation threatens public investments consisting of buildings, campgrounds, ski facilities, and related recreational developments (protection of taxpayers' investments).
 - c) Infestation threatens forestry values on adjacent lands (responsible land manager, "good neighbour" principle).
20. Lands, Parks and Housing Deputy Minister on March 25 requested authorization from Deputy Minister of Forests to spend \$100,000 from the MOF administered Emergency Pest Fund. Reply on April 14 from the MOF Deputy authorized their allotment and concurred with operational control being under PORD.
21. PORD Lower Mainland Region and Manning District implemented the control program and a public information statement was mailed to potential concerned groups documenting reasons for management actions and justification for the control program. Cutting operations commenced April 21, 1982, with trees to be disposed of on site.
22. In mid-May an MOF District staff member delayed authorization of MOF burning permit for on-site disposal on grounds that conditions were not suitable. A sawmill in Merritt learned of the situation and the potential amount of wood (5,500 trees) and then contacted the Ministries regarding milling of trees. After discussion between the Ministries, a decision was made that milling should take place. The Merritt sawmill then took logs out of the park for milling prior to beetle flight. Weather after mid-May was unusually warm and dry, likely prohibiting the proposed on-site disposal.

23. Completion of operations resulted in the removal of 5,500 infested trees at a cost of \$114,000 or \$20.73/tree. September/October, 1982 inspections by CFS and MOF revealed only residual beetle populations, necessitating the removal of an additional 250 trees by parks staff prior to the 1983 flights. *- too expensive
- it did not have
to cost this
much*
24. The control project, at this point, is regarded as a success from an entomological viewpoint, well conducted operationally by PORD Manning District, and as an example of cooperative interagency, forest pest management.
25. On-going monitoring will be conducted to assess the long-range effectiveness of the treatments.