

## Preliminary Assessment of Blowdown in the Helmcken Falls

### Placid Lake Region of Wells Gray Provincial Park

#### Executive summary

1. Population of spruce and Douglas-fir beetle will increase due to the combination of large diameter downed trees and current spot infestation.
2. Management priorities for 1996/1997 should focus on high-use areas such as road right of-way, campgrounds, picnic areas, trail heads and the look-out at Helmcken Falls
3. Bark beetle infestation will occur in the near future (3-5 years) but may not necessarily impact negatively on park values.
4. Hazard rating of stands in high-use and adjacent areas should be conducted and will provide an accurate assessment of future impacts to high-use areas from such infestation.
5. Downed trees should be surveyed in the summer and fall of 1997 for utilization by spruce and Douglas-fir beetle.
6. Overview flight surveys should be conducted to monitor recent tree mortality.
7. Probes should be conducted in spot infestations.
8. The blowdown patches immediately north of Helmcken Falls should be used as a trapping system with removal planned for the winter of 1997/1998

#### Situation Overview

A severe windstorm, in August of 1996 created a large amount of blowdown in the southern portion of Wells Gray Provincial Park. Fifty patches, totalling 517 ha in size, have been mapped by Atlas Information Management. Several species of bark beetles are present in the area of blowdown. The two principal species are the Douglas-fir beetle (*Dendroctonus pseudotsugae*) and spruce beetle (*D. rufipennis*). Both can be highly destructive. Both prefer recently-downed trees. Rangers with the Canadian Forest Service have identified 6 spot infestations of Douglas-fir beetle in the Helmcken Falls Placid Lake region. Each spot consists of 5-10 currently/recent infested trees. Two spot infestations of spruce beetle were also noted.

Staff are currently removing danger trees along the road right-of-way. Trail crews have already cleared most of the blowdown along trails, leaving bucked material alongside. My task was to provide an initial assessment of the risk/hazard to park resources from bark beetle arising from the current blowdown. Specifically, I linked assessment of the abundance and quality of downed trees with assessment of risk and hazard from bark beetle. The work was confined to the Helmcken Falls – Placid Laker region due to access limitations and critical park values.

## **Survey Protocol**

Surveys of downed trees were conducted October 31 and November 1, 1996. in the area of Helmcken Falls to Placid Lake in Wells Gray Provincial Park (Figure 1). Five 10 m x 100 m plots were assessed in some of the most severe area of blowdown (Sites A, B, E and H). The Pyramid Mountain trail was examined over a distance of 4.5 km (site C). The Dawson Falls trail was examined to the Blackwater River (2.5 km) (Site D). Two additional sites (F and G) were assessed over a distance of 300 m each. Tree species and diameters were the principal data obtained. Incidence of beetle activity were noted as they were discovered.

**Insert Figure 1. Map of sampling sites and blowdown patches**

## **Risk Stand Hazard and Resource Impact**

The impact of bark beetle activities will be determined by three factors: (1) abundance of bark beetle (risk); (2) likelihood of trees dying from attacks by bark beetles (stand hazard); and tolerance of such mortality by stakeholders (resource impacts).

Douglas-fir and spruce beetle are present in the area, both in standing and downed trees. Adults will emerge in the spring of 1997 and will infest blowdown material. Both species prefer recently-downed trees. Epidemics generally result from populations buildups in windfall and logging slash. The subsequent abundance of these beetles depends on the abundance of large-diameter spruce and Douglas fir among downed trees.

The density of stems that were downed by the storm ranged from 24 to 94 stems/ha. A majority of the downed material was either spruce or Douglas fir (Table 1). Notable exceptions included Site G and the majority of the pyramid Mountain and Dawson Falls trails. Lodgepole pine predominated these areas past the initial 500 m of trail.

**TABLE 1. Species composition of selected patches of blowdown**

| Site | Douglas Fir | Spruce | Lodgepole Pine | Cedar | Hemlock |
|------|-------------|--------|----------------|-------|---------|
| A    | 25%         | 53%    | 2%             | 14%   | 6%      |
| B    | 4           | 36     | 60             | -     | -       |
| C    | 10          | 39     | 35             | -     | 16      |
| D    | 43          | 29     | 28             | -     | -       |
| E    | 41          | 13     | 33             | -     | 13      |
| F    | 64          | -      | 29             | -     | 7       |
| G    | 5           | -      | 84             | -     | 11      |
| H    | 2           | 75     | -              | 21    | 2       |

*\*Data too few to be reliable*

Blowdown is not constrained to the patches delineated by Atlas Information Management. Low densities of downed trees (5-15 stem/ha) were evident throughout the stands and trails. Beetle will infest downed trees throughout the region – not just within blowdown patches.

The mean diameter of downed spruce ranged from 31 cm to 38 cm, reaching 51 cm at site H along the Placid Lake trail (Table 2). The mean diameter of downed Douglas fir ranged from 40 cm to 75 cm, with one downed tree near Helmcken Falls measuring 150 cm in diameter. The combination of existing infested material along with abundant large diameter spruce and Douglas fir in the area will provide both species with an opportunity to increase in population size, possibly to levels that could initiate large scale epidemics. Additional blowdown occurring along newly exposed forest margins will make the situation even more critical, resulting in higher likelihood of a major infestation.

**TABLE 2. Mean diameters (dbh) of downed spruce and Douglas fir**

| Sites | Spruce    | Douglas fir |
|-------|-----------|-------------|
| A     | 38 +/-4   | 55 +/-7.3   |
| B     | 31 +/-2.6 | -           |
| ....E | 31 +/-2.4 | 40 +/-2.0   |
| G     | -         | 51 +/-2.7   |
| H     | 51 +/-1.9 | -           |

A review of aerial photography from 1991 revealed a complex landscape of stand age and composition throughout the region. Tracks of mature spruce and cedar, and patches of pine and mature spruce and Douglas fir, are intermixed with larger areas of immature lodgepole pine and mature tracts of lodgepole and Douglas fir. Trembling aspen and paper birch are prevalent in the region as well.

Mature stands and/or Douglas fir seem to be abundant on both sides of Murtle River, from Helmcken Falls to Dawson Falls, and along both sides of the principal access road from Dawson Falls to the park entrance. A significant level of mature trees is also present from the Placid Lake trailhead to Placid Lake, as well as along the Green Mountain Ridge. These areas coincide with high use activities of park users.

Other major tracts are present on the western slope of Battle Mountain and Fifty-two Ridge, and due south of the parking lot near McLeod Hill. However, the lack of inventory data precludes conclusive evaluation of stand hazards in the region. Data such as age, composition, volume and site characteristics should be obtained for future management opportunities.

In general, the stand hazards in the region seem higher for spruce beetle than Douglas fir beetle. The current incidences of Douglas-fir beetle represents the most northerly portion of their range within the Kamloops Forest region. Beetles do not tend to do well in the Interior Cedar-Hemlock zone. Infestations are generally contained to a low level, rarely developing to the large scale tree mortality scenarios seen in the Interior Douglas Fir Zone.

In contrast, the hazards are high for spruce beetle in some areas. Stands with an average diameter greater than 41 cm in well drained creek bottoms and a volume greater than 300m<sup>3</sup> are generally considered as high hazard. The stand near the Placid Lake trailhead would certainly qualify. Large scale infestations have occurred in previous years such as on the southern slopes of Trophy Mountain.

Tolerance of mortality by bark beetles is an issue that should be addressed by park staff in consultation with stakeholders. The landscape complexity of stand age and composition suggests that most infestations would be contained by type changes. The composition of numerous small and large patches of meadow and immature pine stands suggests a history of bark beetle, fire and blowdown events. Bark beetle infestations may be a critical factor in the maintenance of such stands at the landscape level. Long term management plans should incorporate these views along with detailed surveys and assessments over the next two years.

The immediate concern seems to lie with the high use areas from the park entrance to Helmcken Falls. Such areas do not have the buffering capacity to absorb large scale impacts

such as bark beetle infestations. If visual quality and visitor safety are major concerns the such areas warrant management actions.

### ***Treatment Regions and Options***

In general, the potential impact from bark beetle is not immediate. Adults will emerge in the spring of 1997 and attach downed trees. Broods of Douglas-fir beetle will likely over winter as adults, emerging in the spring of 1998. Broods of spruce beetle will likely not emerge until the spring of 1999. The presence of new downed material at these times will result in dramatic increased in population numbers. Emerging beetle may attack new blowdown or stranding trees. Park staff should anticipate monitoring the situation for 3-5 years. Monitoring of infested material and new blowdown in conjunction with hazard ratings for stands within and adjacent to high-use areas will provide comprehensive information on the likelihood of infestation in standing trees and impact on resource values.

### ***Road Right-of-Ways, Picnic Sites and Campgrounds***

The visual quality and safety values in these areas may require immediate actions. Bark beetles tend to concentrate along forest margins such as right-of-ways, possibly due to meteorological parameters and stable pheromone plumes.. Pheromones are an essential component of the ability of beetles to aggregate on suitable hosts in a timely manner. Downed trees in these areas will have a higher likelihood of attacks by beetle relative to standing trees, thereby incurring an impact to visual values.

Removal of downed material to one tree-length into the stands would minimize this possibility. Furthermore, many trees broke off at heights of 5-10 m. These should be removed as well, leaving a minimum in stump and slash. As previously stated, both the spruce beetle and Douglas-fir beetle thrive on logging debris. Any treatment action can be voided by inappropriate removal of such debris.

### ***Helmcken Falls Lookout***

The blowdown patches north of Helmcken Falls contain a high proportion of large diameter spruce and Douglas fir. Both spruce beetle and Douglas-fir beetle were found in downed and standing trees in this area. Material infested in 1997 should be removed along with any recent blowdown during the winter of 1998/1998 in order to minimize impacts to the lookout area, again for the protection of visual quality and safety values.

## ***Trails***

The need for specific forest health actions along trails is low, except for trailheads. Trailheads are part of forest margins along the road right-of-way and will have a higher concentration of beetle activity. Spillover attacks are more likely in such situations.

The removal of downed trees elsewhere along the trails may not accomplish a reduction in risk. Downed trees are prevalent throughout the stands. There is no reason to expect higher slash utilization along trails. Treatment actions may in fact create fresh slash material which will attract beetles. Bark beetles are very responsive to host volatiles. Newly-cut surface emit more volatiles than intact trees.

Bucked material created in opening the trails for use by hikers and skiers does not pose any additional risk. There is plenty of host material all along the trails and throughout the forest. The small amount of bucked material is not going to add much to the overall scenario.

Pyramid Mountain and Dawson Falls trails have significant amounts of spruce and Douglas fir only for the first 400-500 m. of trail. The blowdown along the remainder of these trails is primarily lodgepole pine with a minor component of smaller diameter (20-30 cm dbh) Douglas fir and spruce. These areas should not pose a problem in the near future.

## ***Treat Consideration***

At this time, treatment should be restricted to high-use areas. Removal of downed material up to one tree length into the wood should be conducted during the winter of 1996/1997. Logs can be either bucked and burnt or removed from the park. All logging debris should be kept to a minimum with low stumps and 10 cm diameter utilization. Standing stumps from trees that broke 5-10 m above ground should be removed.

Surveys of slash utilization should be conducted in the summer and fall of 1997. These will provide information on risk to standing trees by identifying population centers of beetles. Surveys for blowdown occurring during 1997 will be critical in minimizing future risk. Recent openings will undergo a stabilisation period of additional blowdown until the stand margins become wind firm. Populations of beetle will expand exponentially with this type of material supplied over several years. Of particular concern is the new road right-of way created for a new camp ground near Pyramid Mountain.

The blowdown patches immediately north of Helmcken Falls may require treatment in 1997/1998. This area has a high concentration of large diameter spruce and Douglas fir (downed and standing). Twenty current/recent infested Douglas fir were identified by

aerial survey. I found 3 downed trees with current spruce beetle brood. The downed trees will serve as a populations sink in 1997. Removal or burning of the downed trees during the winter of 1997/1998 would significantly reduce the risk around Helmken Falls lookout. At the same time, recent blowdown occurring in 1997 could be removed. Treatment actions should again minimize logging slash. Helicopter logging may be a viable option in this area, reducing the need for access corridors through the strand margin.

If possible, trees should be removed promptly from the park rather than cold decked over the winter. Piles of logs will be attacked in the spring and may result in spillover attacks onto adjacent standing trees. If the trees cannot be removed immediately, decks should be placed in stands of low susceptibility such as immature lodgepole pine, at least 50-100 m from mature spruce or Douglas fir.

The use of pheromone based tactics should not be considered at this time. Attractive pheromone baits are not required since there is a vast amount of blowdown to draw them away from standing trees. A repellent pheromone, MCH, has had limited success for both beetles in Idaho and Alaska. However, these trials have not been repeated, certainly not in British Columbia conditions. Moreover, MCH can be attractive to both spruce and Douglas-fir beetles at low concentrations. The risk of creating a bigger problem in these higher sensitive areas should negate the use of pheromones.

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18 November, 1996