

Mountain Pine Beetle and Water Management: Workshop Summary

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The mountain pine beetle (MPB) infestation continues to expand in British Columbia's Southern Interior, raising concerns about the potential impacts on the region's water resources. To address this issue, FORREX and the Southern Interior Beetle Action Coalition (SIBAC) delivered a 1-day workshop in Kelowna on June 2, 2009. The primary audience was water purveyors who may have to deal with the potential downstream effects on water supply and treatment systems. A large number of community water systems in the Interior could incur increased treatment costs if water quality is degraded due to an MPB infestation; therefore, a critical need exists for water purveyors, as well as land managers, to understand the range of potential impacts that can occur. Although a number of recent publications synthesize the research on the effects of MPB and salvage harvesting (Winkler et al. 2008; Redding et al. 2009), extension efforts have not been directed towards the supply of safe drinking water. This workshop provided a more operationally oriented follow-up to the MPB and Watershed Hydrology workshop held in Kelowna in 2007 (Redding and Pike 2007).

Below we list the workshop presentation titles with reference to their respective summaries, which are available on the FORREX website (www.forrex.org/program/water/PDFs/Workshops/MPB_Handout.pdf).

Then we highlight some of the key points raised during the presentations and panel discussion, and outline information needs and results of the post-workshop evaluation.

Workshop Topics

Overview Presentations

- The Mountain Pine Beetle Story: The Path of the Outbreak and Future Opportunities
 - Lorraine Maclauchlan, BC Ministry of Forests and Range (pp. 19–20)
- Mountain Pine Beetle and Watershed Hydrology
 - Rita Winkler, BC Ministry of Forests and Range (p. 21)
- Climate Change and Water in Western North America: Knowns, Unknowns, and Adaptation Strategies
 - Kathleen Miller, National Centre for Atmospheric Research (pp. 37–38)

Emerging Research Results

- Quantifying the Peak Flow Impacts of Mountain Pine Beetle and Salvage Harvest in the Fraser River Drainage
 - Markus Schnorbus, Pacific Climate Impacts Consortium (pp. 22–23)
- Effects of Mountain Pine Beetles and Timber Harvesting on Stand Attributes and Snow Hydrology
 - Pat Teti, BC Ministry of Forests and Range (pp. 24–25)
- Water Quality Related to Mountain Pine Beetle Infestation: A BC Regional Comparison
 - Sandra Brown, University of British Columbia (pp. 26–27)

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Perspectives from Water Resource Managers

- Okanagan Community Watershed MPB–Hydrological Risk Assessment
 - Bill Grainger, Grainger and Associates Consulting Ltd. (pp. 28–29)
- MPB Impacts on Water Utilities and Potential Mitigation Strategies
 - Bob Hrasco, Black Mountain Irrigation District (p. 30)
- Impacts of the Mountain Pine Beetle on Community Water Supplies
 - Don Dobson, Dobson Engineering Ltd. (pp. 31–32)
- Duteau Creek Watershed Assessment and Protection Planning
 - Renee Clark, Regional District of North Okanagan (pp. 33–34)
- District of Lake Country Watershed Management
 - Jack Allingham, District of Lake Country (pp. 35–36)

Panel Discussion

“What critical issue of the mountain pine beetle infestation related to water resources will shape the future of impacted communities?”

Panel members:

- Rob Birtles (Interior Health Authority)
- Renee Clark (Regional District of North Okanagan)
- Geoff Kendall (Indian and Northern Affairs Canada)
- Markus Schnorbus (Pacific Climate Impacts Consortium)
- Dave Wilford (BC Ministry of Forests and Range)

Key Findings from Workshop Presentations and Panel Discussion

A common theme heard throughout the workshop presentations was that the death of pine forests following the MPB infestation may have effects on the quantity, timing, and quality of water from affected

watersheds. This concern can be summed up with the phrase “more water, more quickly, more often.” The actual magnitude and direction of hydrological effects will depend on watershed characteristics and weather, as well as post-MPB forest management actions (salvage harvesting). “More water” refers

to the potential for increased streamflow and groundwater recharge due to increased winter snowpacks and a reduction in evaporative losses to the atmosphere in beetle-affected stands. “More quickly” refers to the potential for earlier snowmelt due to increased radiation and more rapid streamflow response to melt runoff and rainfall as a result of altered hillslope flowpaths. “More often” refers to an increased frequency of streamflow

events of a given size, relative to an undisturbed or unharvested watershed. Subsequent presentations supported the “more water, more quickly, more often” mantra, with the following key points noted by researchers for consideration by water resource managers.

- Snowmelt rates in salvage-harvested stands are greater than those in stands where dead pine are retained; this effect can persist for about 30 years.
- Model simulations indicate that peak flow magnitudes increase with the area of salvage harvesting.
- A regional study found little short-term influence of the MPB infestation on chemical water quality across the province, and

that water quality concerns arising from the infestation are primarily related to forest management responses (e.g., road building and salvage harvesting).

- As water quality is degraded, treatment costs increase. This can be relatively more problematic for water systems that do not have

back-up sources (e.g., off-line storage or groundwater sources) and a relatively low ability to install the required treatment infrastructure. For this reason, a multi-barrier approach to drinking water protection (source water protection through to treatment) is desirable.

- Water managers have very limited to no control (and potentially little input) on the land management activities that

occur in the source water areas. This makes it difficult to ensure water quality stays high from the source to the tap. Therefore, it is important that water purveyors work closely with land and water management agencies and license holders conducting activities within the watershed to ensure that source water concerns are included in the management of upland water source areas.

- The MPB and salvage harvesting are not the only (or even primary) threats to water quality in community watersheds. Forest fire risk and the possible damage to stream channels and riparian zones by off-road vehicle enthusiasts and livestock are also concerns in maintaining clean water supplies.

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- Within the Southern Interior, climate change has the potential to affect water quality through warmer water temperatures and, when combined with forest disturbance, increased nutrient loading to lakes and reservoirs, which can lead to algae blooms. These effects are expected to be greater at mid- and low-elevation reservoirs.
- First Nations' water systems in the province are at considerable risk as the watersheds are outside reserve boundaries and capacity issues affect the operation of the water distribution and treatment systems.
- Uncertainty surrounds the post-infestation effects of forest regrowth on water supplies in the mid- to long term.
- Given the changes in land cover and climate, the assumption of stationarity in flood frequency is likely violated. This creates increased uncertainty about the planning and design requirements for a flood of a given return period (e.g., 1 in 100 year flood).
- Strategies must be developed to account for uncertainties related to climate change and disturbance; all land management and policy decisions should be:
 - robust to predictable changes,
 - resilient to surprising changes, and
 - adaptable to changing conditions and new information.

Continuing Information Needs

A number of continuing information needs were identified during the presentations and panel discussion and in the post-workshop evaluation survey. Strong support was evident for continued research into the effects of the MPB and salvage harvesting on water quantity and quality. Some of the more specific information needs identified included:

- Reduced uncertainty about the role of understorey and regeneration on hydrologic recovery
- How well do hydrologic models predict the potential effects and how can these models be linked with field research
- Given the potential interacting effects of MPB and climate change, what are the potential implications for low flows as forests regrow

Workshop Evaluation

Of the 79 workshop attendees, 44 (56%) completed the post-workshop evaluation survey, providing valuable information for the development of future events and extension products. Over 70% of survey respondents indicated that they had greater knowledge of the potential hydrological and water treatment effects of the MPB infestation and salvage harvesting after attending the workshop. Overall, the workshop was rated as good or excellent by 96% of the respondents. Several respondents suggested that a follow-up workshop be held within 2 years as the infestation starts to decline and more research results and operational case studies become available.

Sources of Further Information

The workshop handout with two-page summaries of each presentation is available at: www.forrex.org/program/water/PDFs/Workshops/MPB_Handout.pdf

In addition, video of selected presentations will be available on the SIBAC website (<http://sibacs.com/>).

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