



June 19, 2012

Assessment of Potential Wildfire Impacts

State of Knowledge:

Three key elements affect potential wildfire impacts on the mid-term timber supply:

- ***weather and climate***, including current weather conditions and predicted climate change impacts;
- ***fuels***, and in particular, fuel types generated by beetle-killed stands over the course of time; and
- ***wildfire suppression success*** in relation to fire behaviour and wildfire response priorities.

Current Conditions:

- 23 timber supply areas are currently affected by the mountain pine beetle infestation. (Although not addressed here, losses in stands outside of beetle zones will also affect provincial timber supply.)

Weather and Climate Change:

- Weather is the main influencing factor on both fire starts and fire spread as many major fires are the result of a combination of extended drought drying fuels and wind spreading the fire. Lightning is a major cause of fire starts.
- On a yearly basis, weather is quite unpredictable – 2009 and 2010 were record extreme fire years, and 2011 set a record with few fires.
- Future conditions as a result of climate change can be predicted and are expected to have:
 - little effect on northwestern British Columbia
 - significant impacts for the southern interior – an increase of 4⁰C by 2080¹ is expected to result in increased fire size²; increased fire severity³; increased fire season length and fire frequency⁴; increase in crown fire ignition and severe fire behaviour⁵, and a decrease in extent of fire free areas⁶.
 - significant impacts in boreal ecozones (including many of the beetle-impacted areas) – the annual area burned is predicted to increase by 50% to 300% in the next 100 years.⁷

¹ Haughian, S. et al, 2012

² Doubling from an average of 7,961 ha to 19,076 ha

³ By 40% in spring, 95% in summer and 30% in fall

⁴ By 30%

⁵ By 4% to 7%

⁶ By - 39%

⁷ Haughian, S. et al, 2012; also supported by research done in the US National Research Council

Fuels and Beetle-Generated Fuel Types:

- It is estimated that 18.1 million hectares of B.C. has been affected by the beetle infestation, and that 787.8 million cubic metres of pine will have been killed by 2017.
- Recent fire behaviour analysis has shown the observed rate of spread in predominantly beetle-affected fuel types is 2.6 times faster than in healthy green stands, and can reach rates of 66 metres a minute.
- Dead pine stands have created a new fuel type in B.C. that is estimated to be increasing at a rate of 808,327 hectares annually, and will be present for decades to come.
 - Changes associated with this fuel type include rapid transition to fast moving, high-intensity fires with large amounts of flaming embers spreading ahead of the fire.
 - Since rate of spread can be roughly correlated to fire intensity, these fires may be three times more intense than what could have been expected for similar, but healthy, stands.
 - It can also be expected that wildfires in beetle-affected stands will generate extreme wildfire behaviour, reducing suppression success and increasing the area burned.

Wildfire Suppression Success and Wildfire Response Priorities:

- The Insurance Bureau of Canada predicts that the incidence of severe wildfires will increase in B.C. by 50% or more over the period to 2050. During severe wildfire events, wildfire response priorities, in order of priority, are protection of people; communities and critical infrastructure; ecological and environmental values such as watersheds; and timber.
 - During mass wildfire starts, often triggered by lightning, response resources are often limited, and protection of timber is a lower priority.
 - In 2009, wildfire response often focussed on interface fires, resulting in lost timber values.
 - Direct fire control may not be an option and response may be limited to a flank attack or suspended until extreme wildfire behaviour improves.
 - Due to the predicted extreme intensity of some mountain pine beetle fuel fires, suppression success may be very limited until major weather changes occur. This was evident in the 2010 wildfires that affected the Cariboo.

Trends in Wildfire Impacts:

- Between 2003 and 2010, a total of 1.14 million hectares was impacted by wildfire provincially, and 819,000 hectares, or 72% of all fires, occurred within the 23 beetle-impacted units.
 - In 2004, 2009 and 2010, 414,000 hectares was affected, 340,000 hectares on the timber harvesting land base – or about 51 million cubic metres of timber volume.
- Government has invested more than \$100 million across B.C. (primarily in beetle-impacted units), to assess and reforest productive areas impacted by wildfire since 2003. It invested another \$33 million (with \$3 million pending) in payments to BC Timber Sales and licensees under the *Forest and Range Practices Act* s.108 to restore impacted harvested areas across the province.

Summary: Potential Wildfire Impacts on Mid-Term Timber Supply:

- Changing weather and climate and fuel types will result in longer fire seasons, more area burned and more extreme wildfire behaviour that will reduce wildfire suppression success.
 - Reduced suppression success and response priorities that focus on protecting interface values will result in increased area burned.
 - By 2052, B.C. will be roughly half of the way through the expected climate change scenario.
 - Using a relatively conservative estimate of 25% increase in burned area for each decade in the four decades during this time period, and basing the projection upon the recent burned over areas in the 23 beetle-impacted units (340,000 hectares since 2003), the projected timber harvesting land base impact within the 23 units is:
 - 25% increase in area burned: 2012 – 2022: 425,000 ha
 - 50% increase in area burned: 2022 – 2032: 510,000 ha
 - 75% increase in area burned: 2032 – 2042: 595,000 ha
 - 100% increase in area burned: 2042 – 2052: 680,000 ha
- **Estimated total Area: 2.2 million hectares**
 - **Estimated total volume: 331.5 million cubic metres (using 150 m³/ha)**

Landscape Wildfire Management Planning

- Landscape wildfire management planning can reduce impacts to the timber harvesting land base.
- Modelling can be used to predict wildfire probabilities and high wildfire risk areas, and these areas can then be managed to reduce wildfire risks and threats through targeted harvesting and modified forest management practices.
- This will produce short-term fibre opportunities and reduce impacts on mid-term timber supplies.

Supporting Information:

Forest Analysis and Inventory Branch. Provincial 2003 to 2010 Wildfire Mapping Update Project Data Tables. Ministry of Forests, Lands and Natural Resource Operations. Province of British Columbia. Canada.

Haughian, S., Burton, P., Taylor, S., Curry, C. 2012. Expected Effects of Climate Change on Forest Disturbance Regimes in British Columbia. BC Journal of Ecosystems and Management 13 (1) 1 – 24. Published by Forrex: Forest Extension for Research and Natural Resources. British Columbia. Canada.

Hirsh, K., Martell, D. 1996. A Review of Initial Attack Fire Crew Productivity and Effectiveness. Int. J. Wildland Fire 6 (4): 199 – 215. IAWF. USA.

Hvenegaard, S., 2012. National Wildland Fuels Management Survey: Contract Report CR 729. FP Innovations. Hinton, Alberta. Canada.

Institute for Catastrophic Loss Reduction, 2012. Telling the Weather Story. Insurance Bureau of Canada.

National Research Council, 2011. Climate Stabilization Targets: Emissions, Concentrations, and Impacts over Decades to Millennia. Washington, D.C.: National Academies Press.

Parisien et al., 2005. Mapping Wildfire Susceptibility with the Burn-P3 Simulation Model. Information Report NOR-X-405. Canadian Forest Service. Northern Forestry Center. Government of Canada.

Perrakis, D., Lanoville, R.A., Hick, D., Taylor, S.W., Lavoie, N., Kubian, R. 2012. Recent Observations of Fire Behaviour in Mountain Pine Beetle-Affected Forest Stands in British Columbia, Canada. In Progress.

Resource Practices Branch, 2012. Provincial 2003 to 2010 Wildfire Mapping Update Project Data Tables. Ministry of Forests, Lands and Natural Resource Operations. Province of British Columbia. Canada.

Walton, A. 2012. Provincial Level Projection of the Current Mountain Pine Beetle Outbreak: Update of infestation projection based on the Provincial Aerial Overview Surveys of Forest Health conducted from 1999 to 2011 and the BCMPB (year 9). Ministry of Forests, Lands and Natural Resource Operations. Province of British Columbia.

Westfall, J. and T. Ebata. 2011. Summary of forest health conditions in British Columbia (2010). Pest Management Report No. 15, Ministry of Forests, Mines and Lands, Victoria, BC.