



MINISTRY OF FORESTS, LANDS AND NATURAL RESOURCE OPERATIONS, POST-WILDFIRE RISK ANALYSIS – PRELIMINARY REPORT

NOTE: The results given on this form are preliminary in nature and are intended to be a warning of potential hazards and risks. It is not a final risk analysis and further work may alter the conclusions. Please contact the author for more information.

FIRE: Blacktail Mountain N51329		FIRE YEAR: 2018	DATE OF REPORT: 10 Dec, 2018	
AUTHOR: Sarah Crookshanks				
REPORT PREPARED FOR: District Manager, Southeast Fire Centre				
FIRE SIZE, LOCATION, AND LAND STATUS: 2000 ha. Fire is located in the headwaters of Silverton Creek east of the Village of Silverton.				
VALUES AT RISK: Village of Silverton, Highway 6				
WATERSHEDS AFFECTED:	TOTAL AREA	AREA BURNED	BURN SEVERITY (% of burned area)	
Silverton Creek	12180 ha	2000 ha (16%)	500 ha, 25% Low 930 ha, 47% Medium 570 ha, 29% High	
SUMMARY OF HAZARDS AND RISKS³:			HAZARD¹	RISK²
<p>Hazards: The most significant hazard is flooding caused by snowmelt</p> <p>Risks:</p> <ol style="list-style-type: none"> 1. Risk of spring flooding impacting the Village of Silverton 2. Risk of spring flooding impacting Highway 6 <p><small>1. Hazard = P(H), the probability of occurrence of a hazardous event 2. Risk = Partial risk P(HA) = P(H) × the probability of it reaching or affecting an element at risk 3. Rating definitions consistent with Land Management Handbook 69, Postwildfire Natural Hazards Risk Analysis in British Columbia (Province of British Columbia, 2015)</small></p>			M M	L L
RECOMMENDATIONS:				
<ol style="list-style-type: none"> 1. The Village of Silverton should monitor water levels in Silverton Creek and their flood protection works during spring freshet. The Village of Silverton is also responsible for ensuring their flood protection works are well maintained. 2. The effects of the Blacktail Mountain fire on hydrological processes should be taken into account when planning future forest development (either salvage logging or the development of non-burned areas) in the Silverton Creek watershed. 				
POTENTIAL MITIGATION:				
Flood protection works owned by the village are already in place on the Silverton Creek fan. No mitigation within the fire perimeter is recommended.				
COMMENTS:				
<p>The impacts of the Blacktail Mountain fire on snowmelt-dominated peak flows will likely continue for several decades as the tree canopy is re-established within the fire perimeter.</p> <p>The gradient of Silverton Creek is below the threshold for transport of debris flows and floods; therefore any landslides that may occur within the fire perimeter do not pose a hazard to infrastructure on the fan.</p> <p>There is one domestic water licence on Silverton Creek in the name of Klondike Silver Corporation; based on the file information, it is unlikely that the licence is in use at this time.</p>				
SIGNATURE:		ATTACHMENTS:		
Original signed and sealed by Sarah Crookshanks, P.Ge.		See attached memo and map for further details.		
REVIEWED BY:				
Original signed and sealed by Natasha Neumann, P.Ag.				

Post-Wildfire Natural Hazards Risk Analysis, Fire N51329, Blacktail Mountain

Sarah Crookshanks, MFLNRO, December 10 2018

Introduction and methods

This memo provides additional information that is intended to supplement the initial preliminary report summary form (attached). The Blacktail Mountain fire burned approximately 2363 ha of land in the headwaters of Silverton Creek. The fire was initiated by lightning and was discovered on July 19, 2018. A natural hazards risk analysis of the fire was completed following the procedures outlined in Land Management Handbook 69 (Hope et al., 2015).

On August 30, 2018, an overview flight was completed by Sarah Crookshanks (MFLNRORD). The fire was still burning at the time, although the fire did not expand much through September. On October 10, 2018 a ground assessment of the fire was completed by Sarah Crookshanks and Natasha Neumann (MFLNRORD).

The burn severity mapping was provided by MFLNRORD Regional Operations based on Differenced Normalized Burn Ratio calculations using same year classification satellite imagery. The original classification under-reported the burn severity; therefore the burn severity classification break points were adjusted to better reflect field observations.

Burned area observations

The burn severity fire map in Figure 1 and the aerial photos of the fire (Figures 2 through 4) show that most of the burned area lies between 1600 and 2000 m on east and west facing aspects. The riparian zones along the valley bottoms for the most part remained unburned. Three burn severity plots were undertaken where access allowed. Soil burn severity was similar to the vegetation burn severity at all three sites.

The most significant post-wildfire hazard for Silverton Creek is flooding caused by snowmelt during the spring freshet. Approximately twenty percent of the Silverton Creek watershed burned, of which almost half is moderate or high burn severity. Approximately 27% of the Silverton Creek watershed above the H60 elevation (1650 m) was burned. The H60 elevation refers to the snowline elevation when the upper 60% of the basin area is still covered with snow. Vegetation removal in the area above the H60 elevation is generally understood to have a greater influence on peak flows due to changes in snow accumulation and snowmelt processes.

Discussion of post-wildfire flood hazard and risk

The Blacktail Mountain fire will increase the likelihood of earlier and possibly higher spring peak flows in Silverton Creek. Even though the proportion of burned area within the overall watershed is low, the potential for the synchronization of runoff is significant based on two factors: elevation and aspect. Assuming that the burned area (mostly located between 1600 and 2000 m) melts earlier, this runoff will combine with the snowmelt from forested land at lower elevations. In terms of aspect, the Silverton Creek watershed is mostly composed of south, east and west facing slopes. Since the fire mostly occurred on east and west facing aspects, the potentially earlier melt from the burned area will combine with the snowmelt from the south facing slopes. While synchronization will increase the likelihood of earlier and higher spring peak flows, the large basin size, wide elevation range and alpine areas may help to moderate the flood response potential in Silverton Creek.

Considering the factors discussed above, there is a moderate likelihood of increased spring flooding in Silverton due to the incremental hydrological effects of the Blacktail Mountain fire. This hazard of spring flooding is due to increased snow accumulation, more rapid snowmelt, spatially synchronized snowmelt, and higher groundwater levels in burned areas, and can persist for many years until revegetation occurs.

The Silverton Creek channel is incised on its fan and the likelihood of avulsion during a spring flood event is low. The Village and the highway contractor should monitor the channel on the fan during spring freshet. The formation of a log jam may cause higher streamflow velocities and exacerbate any bank erosion issues.

Historical disturbances, such as forest harvesting and other wildfires, also affect the frequency and magnitude of peak flows in Silverton Creek; however, the consideration of the cumulative impacts of all disturbances within the watershed is beyond the scope of this analysis. The effects of the Blacktail Mountain fire on hydrological processes should be taken into account when planning future forest development (either salvage logging or the development of non-burned areas) in the Silverton Creek watershed. Further hydrological assessment would be needed to confirm the extent of possible impacts.

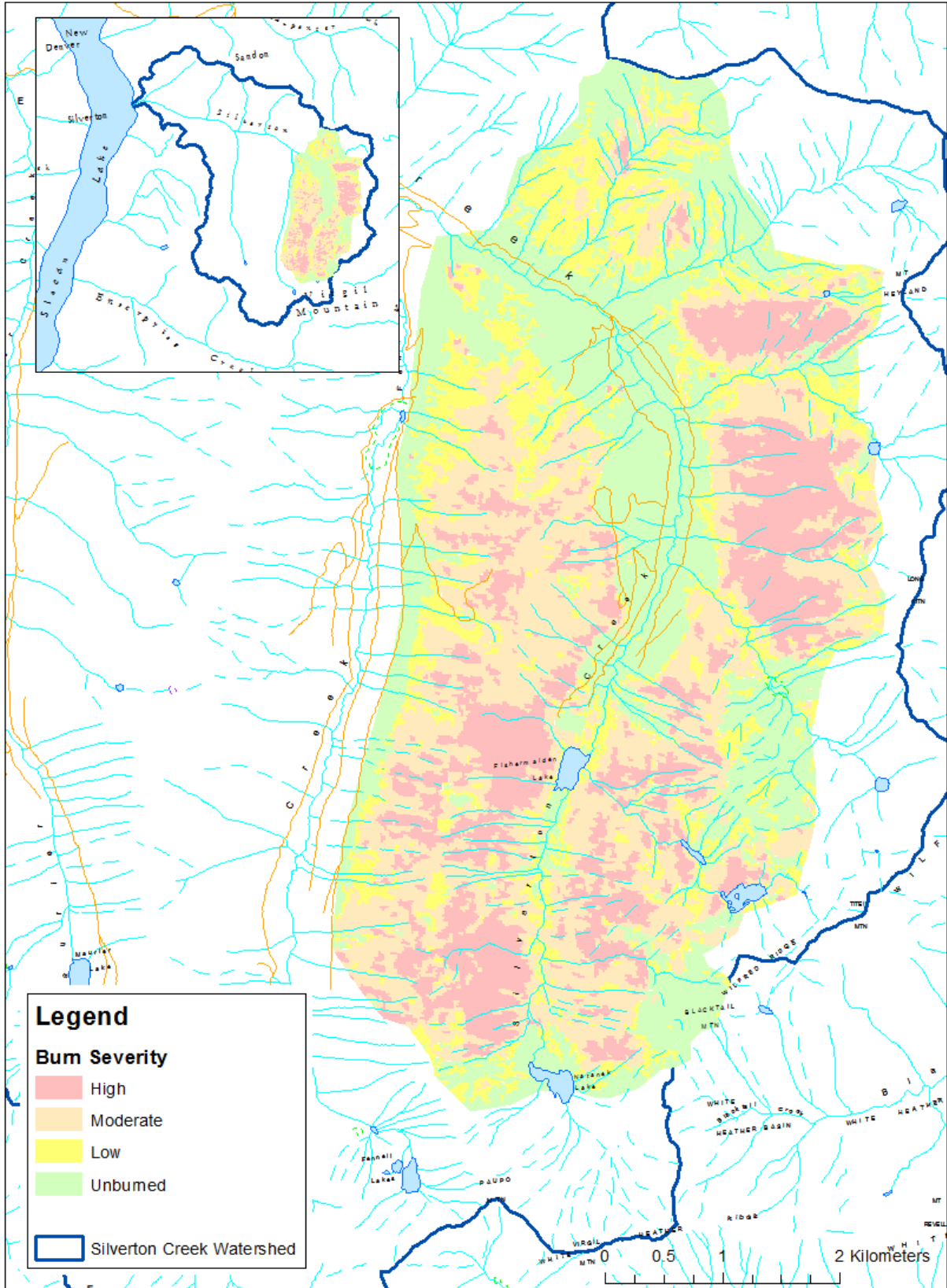


Figure 1. Burned area reflectance classification map of the Blacktail Mountain fire (N51329) showing estimated burn severity. Inset map shows the entire Silverton Creek watershed.



Figure 2. Looking north at the Blacktail Mountain fire from above Natanek Lake.



Figure 3. Looking east at the Blacktail Mountain fire within the Fennell Creek valley (tributary to Silverton Creek).



Figure 4. Looking south towards Nanatek lake.