Forest Practices Board

Salvage Logging after a Wildfire at Sitkum Creek

FPB/IRC/152

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The Complaint

Introduction

In 2007, a wildfire burned in the Sitkum Creek Watershed, near Nelson. The Ministry of Forests and Range (MFR) has approved salvage harvesting of fire-damaged timber in the watershed, to begin in late May 2009. The salvage harvesting is aimed at recovering damaged timber, but is also to address conditions that could lead to a spruce bark beetle outbreak.

Sitkum Creek fire. Proposed cutblock is located between the road and the fire area.

In February 2009, the Forest Practices Board received a complaint from a resident of the Sitkum Creek alluvial fan[1] – an area prone to debris flooding.[2] The complainant believes that the MFR has not sufficiently taken into account the increased risk to life, property and water quality created by the fire and posed by the proposed salvage logging. To support her concerns, the complainant noted that the Ministry of Transportation has upgraded the Highway 3A bridge over Sitkum Creek to increase its flow capacity, and that Nelson Hydro, Shaw Cable and Telus have relocated poles away from Sitkum Creek to avoid flood and debris flood hazards.

In addition, the complainant is not convinced that there is a strong, scientific rationale for harvesting to address the spruce bark beetle.

Background

Sitkum Creek is 16 kilometres northeast of Nelson on the West Arm of Kootenay Lake. There are two subdivisions on the Sitkum Creek alluvial fan — MacGregor and Nine Mile. Highway 3A and natural gas, electricity and cable television infrastructure also cross the fan.

Sitkum Creek is a community watershed, and 25 households draw water from it. Thirty-eight other water users live on the Sitkum Creek fan but draw water from nearby Bourke Creek.

[1] An alluvial fan is a relatively flat to gently sloping landform composed of predominantly coarse grained soils, shaped like an open fan or a segment of a cone, deposited by a stream where it flows from a narrow mountain valley onto a plain or broad valley, or wherever the stream gradient suddenly decreases.

[2] A debris flood is a flood down a steep slope containing a large amount of sediment or debris.

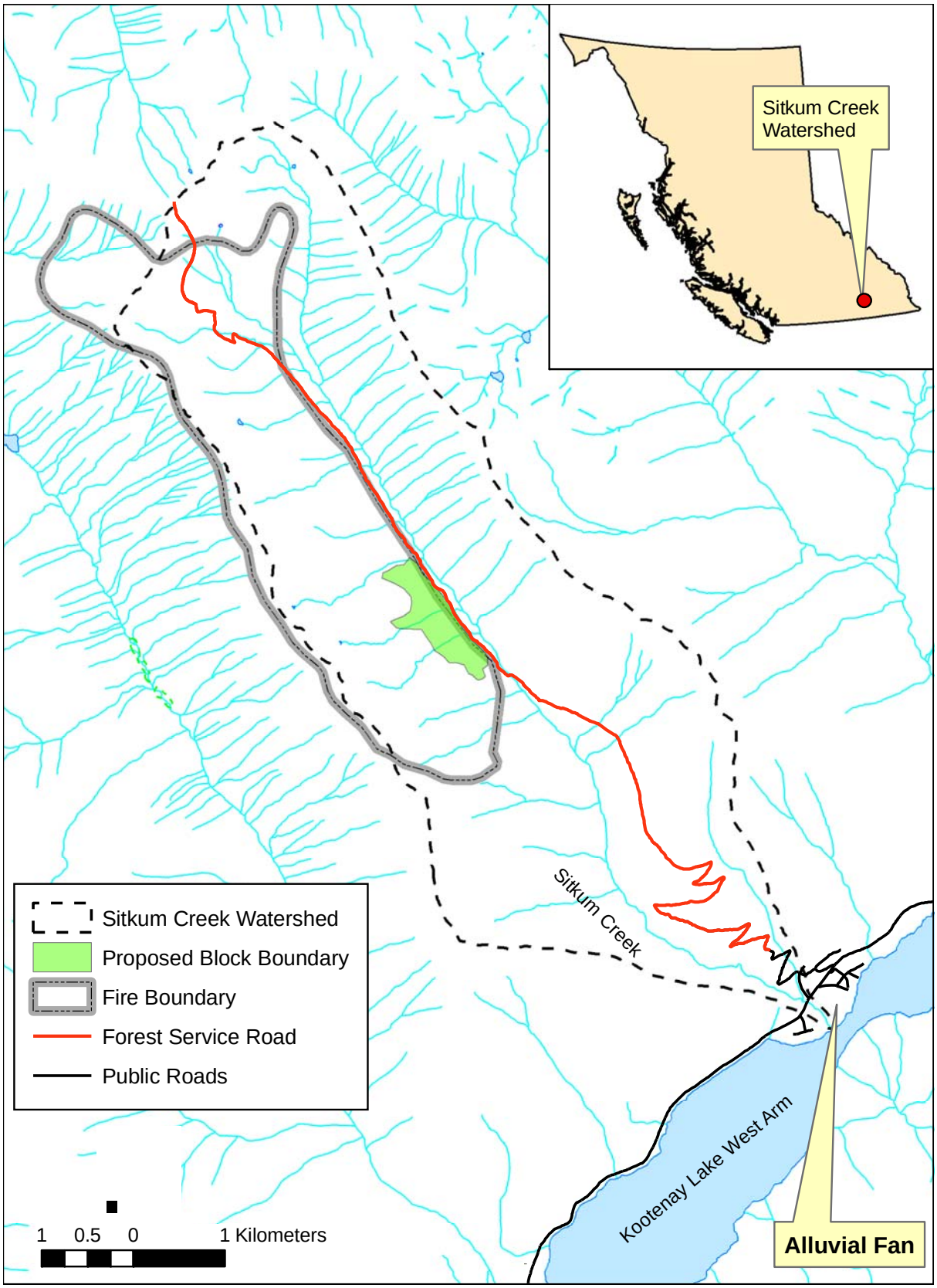

Figure 1. Map of Sitkum Creek showing features discussed in the report.

Although alluvial fans provide relatively flat places to build houses in otherwise mountainous terrain, it can be hazardous to do so. The Sitkum Creek alluvial fan was identified as "a debris flood prone fan with a high hazard rating" in a 1990 hazard assessment, and that was reconfirmed in a March 2008 hazard re-assessment. Since 1968, flooding has occurred once and avulsion[3] twice, according to Ministry of Environment staff.

In July and August 2007, a wildfire burned 39 percent of the Sitkum Creek Watershed. A post-wildfire risk analysis done by the Ministry of Forests and Range (MFR) concluded that increased stream flow and soil erosion from the burned area, and debris flows in tributary streams, were likely to be hazards in the three-to five-year period after the fire.

In terms of risk, the analysis stated:

> There are high risks to houses and the highway from flooding, debris floods, and possible avulsion of the creek channel. The risk of water quality impacts due to sedimentation of the creek is also high.

The Regional District of the Central Kootenay took the lead in advising the residents about the hazards presented by the fire. It sent letters to affected residents, held a public meeting in September 2007, and posted the MFR hazard assessment and other relevant information on its website. This is how the complainant first became aware of the hazards and risk to residents created by the wildfire.

Because the fire was in British Columbia Timber Sales' (BCTS) operating area, soon after the fire BCTS began considering the potential for salvage harvesting. A 60-hectare cutblock consisting almost entirely of spruce was identified as a potential harvest site. This area had been intentionally set on fire, or "back burned" during suppression of the wildfire and the trees were scarred and damaged. During the development of this cutblock in September 2007, BCTS staff and a contractor independently identified spruce bark beetle on fire-damaged spruce trees.

BCTS advised local residents of its harvest plans, but both the Bourke Creek and Sitkum Creek water users opposed salvage harvesting in the watershed, based on the risk to water quality, life and property. In response, in February 2008, BCTS arranged for a hydrologic assessment and a review of the proposed salvage logging. By late April 2008, BCTS decided not to proceed with salvage harvesting.

However, Kootenay Lake Forest District staff were concerned about the potential for a beetle outbreak. Because the fire-damaged spruce in the watershed would be an excellent host for the beetle, the district's forest health specialist was concerned that the infestation might grow to outbreak levels and spread to other watersheds. In early May 2008, district staff met with the

[3] Avulsion is an abrupt change in the course of a stream where the stream leaves its old channel for a new one.

holder of a salvage forest licence (the licensee) to see if it was interested in harvesting the timber.

The licensee was prepared to harvest the timber, as long as the district made the decision that salvage harvesting was an appropriate option. In August 2008 the district manager decided to proceed, prepared a rationale and approved the timber sale. The rationale for his decision is a key part of this investigation and will be discussed in greater detail later in this report.

In June and October 2008, a geoscientist visited the site and assessed terrain stability for the licensee. Part of the assessment considered the combined effects of the wildfire and the proposed cutblock. Based on the assessment, the licensee was satisfied that harvesting would not significantly increase the inherent risk to downstream resources.

The licensee began building a road into the block in late October 2008, in preparation for harvesting. In late November 2008, 200 trap trees were felled in three strips within the block. The ministry's plan is that the trap trees will attract and trap the 2009 spring flight of beetles. The trap trees and their beetles will then be removed as part of the harvesting operation, beginning in late May 2009. The block will be planted in 2010.

The Investigation

To address this complaint, the Board considered the following questions:

1. Did the district manager adequately consider the risk to residents before he approved salvage harvesting?
2. Is the rationale for salvage harvesting to address the spruce bark beetle infestation reasonable?

Discussion

The district manager's consideration of the risk to residents

There is no question that the residents of the Sitkum Creek fan live in a naturally hazardous area, and if a debris flood or similar event occurs, they will be the most affected.

The district manager considered the 2007 post-wildfire risk analysis, and the likely hazards and risk to life, property and infrastructure in the three- to five-year period following the fire.

Next he considered the 2008 hydrologic assessment calculating an increase in Sitkum Creek's equivalent clearcut area (ECA)[4] from 21 percent to 23 percent if the cutblock was logged. This could change the timing and amount of spring runoff, as open areas accumulate more snow.

[4] Equivalent clearcut area (ECA) is a measure of the loss of forest canopy at a certain time in a watershed.

The assessment concluded that salvage harvesting was unlikely to cause an event, but that the increase in ECA would result in a slight increase in the flood and debris flood hazard downstream.

The district manager acknowledged the inherent risk to downstream resources and the incremental risk posed by salvage logging. He said that if there was no forest health issue, he would not be in favour of harvesting. In this circumstance, given the potential beetle outbreak, he considered the implications of harvesting versus not harvesting.

Based on inventory information and the advice of the district forest health specialist, the district manager estimated that 80 percent of the mature spruce in the watershed could be killed by spruce bark beetle if salvage logging was not undertaken, which would increase the ECA by about 90 hectares. Compared to a predicted 70 hectare increase in ECA from salvage logging, the district manager found both options to be comparable.

The district manager also considered the risk of wildfire posed by beetle-killed spruce. He was concerned that, in the event of another wildfire, dead, standing spruce trees would create ladder fuels[5] and increase the likelihood of crown fires.[6] A fire would further increase ECA in the watershed. He consulted with Wildfire Management Branch and learned that the risk of a large wildfire in the watershed was low, but that there was a strong potential for fires 30 to 50 hectares in size.

The increased fire hazard was the deciding factor for the district manager — he believed that the potential for hydrological impacts was greater if the beetle issue was not addressed than if salvage harvesting to control the beetle was to occur.

In the Board's opinion, the district manager adequately assessed the available information and considered the implications both of harvesting and not harvesting. He considered the risk to downstream resources for both options, and chose the option that he believed presented the least risk.

Rationale for salvage harvesting

The district manager's rationale for approving salvage harvesting was based largely on his view that, if nothing was done, the spruce bark beetle infestation would grow and eventually kill the majority of mature spruce in the watershed and adjacent watersheds. The complainant believes that it hasn't been adequately demonstrated that the beetle is present at anything greater than endemic levels. The investigation considered whether there is a reasonable rationale for salvage harvesting to address the beetle.

[5] Ladder fuels provide vertical continuity between surface fuels and crown fuels in a forest stand.

[6] A crown fire burns in the crowns of trees consuming foliage, branches and cones.

Spruce bark beetle life cycle

Spruce bark beetles prefer to attack damaged or stressed spruce, including windfall, logs and fire-weakened trees. At epidemic levels, the beetle attacks healthy spruce trees and feeds on the phloem under the bark until it effectively girdles a tree and kills it.

The spruce bark beetle life cycle typically takes two years. Adults emerge from infested trees during a short period in the spring, typically in May and/or June, and fly to new host trees where they bore under the bark and lay eggs. The eggs hatch and the larvae feed on the tree, overwinter, and begin feeding again in the spring. During the second summer, the larvae pupate. The immature adults emerge and re-enter the same tree at its base where they spend a second winter. The following spring, adults emerge and take flight again to infest new host trees, and the cycle repeats.

Is there evidence of a spruce bark beetle infestation?

The forest health specialist has observed spruce bark beetle activity in the watershed over a number of years. Wind-thrown trees or trees broken and damaged by snow help to maintain endemic levels of spruce beetle.

In September 2007, a contractor for BCTS surveyed the area to assess the potential for harvesting. Examining the quality of the timber and possible road locations, he observed and recorded recent bark beetle attack on 80 percent of the spruce leading stands in the back-burned area. BCTS staff also observed recent bark beetle attack and reported it to the forest health specialist.

The forest health specialist visited the site in September 2007 and confirmed that spruce bark beetle was present in fire-damaged spruce trees and spruce trees piled along the fire guard and road. Since the fire had started on July 27, 2007, she was surprised to see recent attack, because bark beetles usually fly in May or June. She noted that this was an unusually late flight. She consulted with two regional entomologists and concluded that she was observing a second, smaller flight, which could be explained by the time-lag between when the first eggs are laid and the last. This late brood trickles out later in the summer, creating a second, smaller boost in beetle numbers. Considering the size of the second flight, the specialist suspected that the Spring 2007 flight had been substantial.

In 2008, the forest health specialist set up funnel traps in the area to assess that year's beetle flight and to confirm that the spruce bark beetle was on a two-year life cycle. Few beetles were captured and there was little evidence of 2008 beetle activity on fire damaged spruce trees. The forest health specialist concluded that the main flight will occur in Spring 2009, consistent with a two-year life cycle, and she presented this information to the complainant and others at a meeting in July 2008.

Again, in August 2008, the forest health specialist observed evidence of bark beetle activity outside of the burned area, in snow-damaged and wind-thrown spruce. This confirmed her view that conditions in the watershed support low population levels of spruce bark beetle and that a rapid population build-up could occur in the fire damaged spruce.

What could happen?

Based on her field observations, knowledge and experience, the forest health specialist believes that there will be a substantial spruce bark beetle flight into the fire-damaged spruce trees in the spring of 2009. The population will likely reach epidemic levels and, in 2011, it will be large enough to attack healthy spruce trees. Using hazard mapping that depicts stands where substantial losses can be expected to occur if an outbreak of spruce beetle occurs, the forest health specialist estimated that 80 percent, or 184 hectares, of the remaining healthy mature spruce in the watershed could die.

Will salvage logging help control the spruce bark beetle population?

The cutblock boundaries have been designed to incorporate the fire-damaged spruce, but there is other suitable host material in the watershed. During fire suppression, logs were piled along the main road and trees were pushed over to build fire guards. To address this, the licensee has been authorized to remove the logs along the road when it harvests the cutblock. The spruce trees on the fireguards are inaccessible so they have been cut into short lengths and stood on end to dry out. These pieces are not suitable for spruce bark beetle.

Two hundred trap trees have also been felled within the block boundary to attract the local population of beetles in Spring 2009, and these trap trees, with limbs intact, can absorb up to ten times more beetles than standing trees. During salvage operations, these trees will also be removed.

In summary, virtually all of the suitable host material created by the fire, fire suppression activities and the trap trees will be removed from the site when it is logged. If the host material is removed, it should limit the growth in beetle populations.

Conclusion

Natural processes such as insect infestations can be difficult to predict and no one can say for sure what will happen. However, in this situation, we know that spruce bark beetle is present in the Sitkum Creek Watershed, that there is suitable host material in the fire-damaged spruce, and that there are other healthy but susceptible stands in the watershed. The conditions are in place to support a significant increase in the spruce bark beetle population.

In the Board's opinion, these are sufficient reasons to believe that a spruce bark beetle outbreak is likely, and the district manager's rationale for salvage harvesting is reasonable.

Mitigation

The investigation considered what had been done, and what could still be done, to mitigate the risk to residents at Sitkum Creek.

One of the recommendations put forward in the MFR post-wildfire risk analysis was to consider mitigation treatments to two tributaries to Sitkum Creek, to reduce the debris flow hazard. In response, the ministry dropped straw mulch from a helicopter to help reduce surface erosion and sedimentation. Initial results from this action are encouraging.

The risk analysis also recommended deactivating part of the Sitkum Alpine Forest Service Road and that was done in 2008. However, the February 2009 terrain stability field assessment notes that deactivation of one section has not sufficiently addressed the potential for instability and sediment delivery to Sitkum Creek.

As well, the risk analysis recommended that, "a comprehensive watershed risk mitigation and restoration plan should be developed, including a communications plan, to ensure coordination of activities." However, there is no apparent lead agency to address the recommendation.

A professional engineer working for the Provincial Emergency Program considered ways of mitigating hazards on the Sitkum Creek alluvial fan in 2007. Possible measures included: the installation of a wire mesh fence to catch debris; reestablishment of natural drainage; increasing the flow capacity at the Highway 3A bridge; and an early warning system. The Ministry of Transportation has since increased the flow capacity of the bridge, but the other measures have not been implemented. According to the regional district, if the local residents wanted to implement any mitigation measures, the residents would have to pay for it through the creation of a local service.

If a debris flood or other similar event occurs and water quality is affected, MFR has contingency planning in place and has committed to immediately respond to any emergency. Contingency planning ensures a rapid response in the event that water supplies are disrupted. Finally, if uninsurable disaster-related property damage occurs, the Provincial Emergency Program can help with repairs and recovery.[7]

[7] Provincial Emergency Program website http://www.pep.bc.ca/dfa_claims/dfa.html. Current as of May 21, 2009.

Board Commentary

The complainant lives in a naturally hazardous area and the 2007 Sitkum Creek fire increased the risk associated with living there. Now, when faced with the prospect of salvage harvesting, the complainant would rather accept the potential consequences of a possible spruce bark beetle infestation than any additional risk posed by harvesting.

The district manager believes that, if nothing is done about the beetle infestation, the risk to downstream resources may eventually be greater than the risk associated with salvage harvesting the cutblock.

Nothing is certain when it comes to beetle infestations and the effects of wildfire. Faced with that uncertainty, the district manager had to choose between delaying harvesting until the period of greatest risk had passed or approving it. He decided that salvage harvesting posed the least overall risk. Now that trap trees are on the ground and harvesting is going ahead, we will never know what the "right" decision in these circumstances was. However, the Board has concluded that the district manager's decision was reasonable and he adequately considered the information available to him. The choice was his to make.

Sitkum Creek presents both public safety and resource management issues. With anxious residents living in a hazardous situation, careful monitoring of both the spruce bark beetle infestation and harvesting is necessary.

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