Faculty of Forestry
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UBCM/CRD
Fuel Treatment Funding

Project Completion Report

Interface Fuel Treatment at Block 217, Knife Creek Block

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Introduction

Recent fires in BC have had devastating impacts on nearby communities. There is increasing hazard in the urban-forest interface as more communities are building closer to forests. The UBC/Alex Fraser Research Forest has two blocks of Crown Land. The Knife Creek Block of the Research Forest shares a boundary with the Green Valley Estates Subdivision, near 150 Mile House, B.C. UBC/Alex Fraser Research Forest is concerned about fuel loading in the block and the impact that a wildfire could have on both the forest and the subdivision, should one occur. A fire starting on the Research Forest could impact neighbours, and a fire starting on a neighbour's property could impact the Research Forest. The Research Forest has undertaken to reduce the potential impact of a wildfire in the stand of trees nearest the boundary. This was done through a silvicultural treatment called commercial thinning (thinning from below) and then piling and burning the tops, limbs and pre-existing surface fuels. The plan was to remove 350 m^3 of small Douglas-fir with a Ford New Holland 30 hp tractor equipped with a Farmi winch and grapple loader. The trees were marked for cutting before operations began. This stand had undergone a previous fuel reduction treatment in 1994.

Objectives

- To conduct an integrated harvest and fuel treatment adjacent to Green Valley Estates
- To monitor the falling and skidding phases of the commercial thinning operation to determine the productivity and costs
- To monitor the fuel reduction treatments (piling and burning) and document the productivity and cost
- To document the impact of treatments on fuels
- To report on our findings

Methods

Site Description

The Knife Creek Block of the UBC/Alex Fraser Research Forest is located in the Cariboo Regional District, 16 km SE of the City of Williams Lake. The Williams Lake and Area Interface Fire Plan (Williams Lake and Area Interface Fire Committee 2005) includes the western part of the Knife Creek Block. The Knife Creek Block has a management objective to maintain or improve mule deer winter range, and this particular area has a target stand structure that requires that the density of large trees be kept high (Dawson *et al.* 2002).

Block 217 is a narrow strip of land between the west boundary of the Knife Creek Block and the Big Meadow Road, our primary access road into the Research Forest (see Figure 1). The block has a gross area of 4.3 hectares and a net area of 3.8 hectares after roads have been removed. The ecosystem is a circa-mesic site within the Interior Douglas-fir (IDF) zone[3]. The site is used extensively by neighbours for bike riding, walking, dirt biking, and horseback riding.

[3] IDFxm, site series 01, 04, and 06 (Klinka *et al*. 2003)

This narrow strip of land has been managed as a low-fuel area since 1994, when the area was originally treated. At that time the area was pre-commercially thinned, with the thinning debris and existing surface fuels piled and burned. In 2004 we observed that the surface fuels were once-again beginning to accumulate, and the stand was in need of further thinning.

During the pre-harvest planning a water tank was installed within the area by the 150 Mile House Volunteer Fire Department, as a water supply for fighting structure fires in Green Valley Estates. The Research Forest and the Ministry of Forests and Range may access this water supply for fire control outside the subdivision.

Opposition by Neighbours

Three neighbours immediately adjacent to the harvest area were opposed to our plans to treat the area, and mounted a significant impediment to the planning and implementation of the project. We note the Forest Practices Board (2005) advice, which suggested that the public should have the opportunity for input at all planning stages, although the Forest Development Plan is the best opportunity[4]. Planning for the project was extremely detailed, and included three meetings on site. As a result of the input received from neighbours, volume removals were lower than the already low volume planned.

Treatments

Trees were pre-marked to remove all beetle-killed trees and danger trees. Smaller Douglas-fir trees (merchantable and non-merchantable size) were marked to thin from below to maintain a clumpy structure for mule deer habitat. Rolf Schuetze of Williams Lake was the selected contractor. He was to remove the whole trees marked for cutting to the landing and manufacture small and large sawlogs. Saplings, poles, and unmarked trees were to be protected. He piled tops and limbs for burning at the landing, plus any trees that were too small or crooked for sawlogs.

Logging debris and surface fuels that could not be skidded to the landing were piled for burning in the spring in small openings in the stand. Piling was completed by hand with chainsaw and rakes. Piles were burned in March, using a propane tiger torch and a commercial leaf blower for ignition. Re-piling and re-ignition ensured complete combustion of the debris.

Permanent photo points were installed within the stand, with photos taken both before and after the treatments.

[4] Block 217 entered the Forest Development Plan in July 2004.

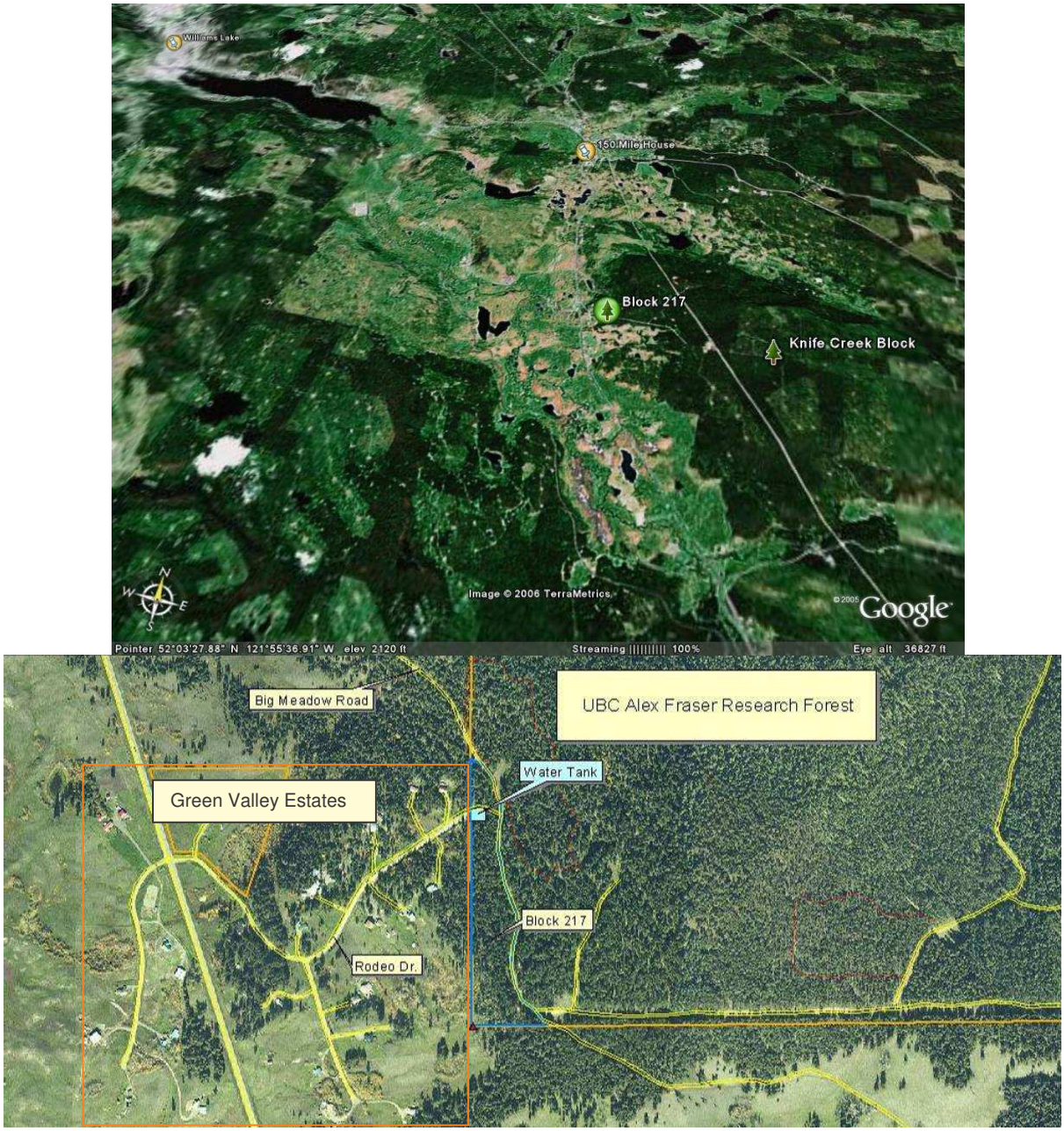

Figure 1: General location (upper) and overview (lower) maps of Block 217, Knife Creek Block of the UBC/Alex Fraser Research Forest. (Upper image ©Google Earth).

Harvesting system

All falling was done by hand using a chainsaw, wedges and a peavey to assist the faller in placing the trees to facilitate skidding. Whole trees were skidded to the landing where they were topped and limbed. Skidding was done with three different pieces of equipment: a Ford 7108 tractor with a Farmi skidding winch, a John Deere line skidder, and a Honda ATV with a skidding arch. The tractor and skidder were used mainly for the larger pieces, while the ATV was used to skid the smaller stems, the non-merchantable material and bundles of slash to the landing.

Figure 2: Honda ATV with skidding arch (left) and Ford Tractor with Farmi winch (right) owned by Rolf Schuetze of Williams Lake.

Study Methods

The scheduled and productive hours were documented by Servis recorders mounted on the John Deere skidder and the Ford tractor. The Servis recorder charts were supplemented by daily records completed by the operators. The operators were asked to record time spent on each activity during the day as they frequently moved between skidding, bucking, decking and falling during the same day. FERIC supplemented the shift-level information for the crew with detailed timing using a hand-held data logger and stop watch. FERIC scaled some sample pieces at the landing to obtain an average piece size for the block. UBC supplied the final harvest volume removed from the block. FERIC also measured the slash distribution in the block after skidding and determined the breakdown in the debris skidded to the landing and that remaining in the block. A modification of the methods used in Sutherland (1986) was used. These results will be reported in the detailed "FERIC Advantage Report".

Results

The crew was on site for 18 days between November 30 and December 22, 2005 and FERIC researchers were on site for 10 of those. Shift level results are based on the operator-reported times and are uncorrected for productive and non-productive time (Table 1). FERIC also conducted detailed timing of treatment phases, to allow analysis of work performed, and these results will be reported in a FERIC Advantage report in the near future.

Standing trees were purposely left at a high density (Figure 3) to reduce the growth of flammable understory grasses, shrubs, and Douglas-fir regeneration that would develop if the stand were more open. The existing moss layer, much less flammable, will be left intact. The low volume removed addressed land-use objectives for mule deer winter range, and was a positive point in the discussions with neighbours.

Table 1: Total hours for each work phase of the treatments for Block 217.

	Falling	Skidding			Piling	Burning	
	Faller	**Ford tractor**	**John Deere skidder**	**Honda ATV**	**Hand piling**	**Hand light and re-pile**	**Ford tractor re-pile**
Total time (hours)	41.5	75.5	12.5	20.5	62.0	31.8	4.5
Time per unit area (hours/ha)	10.9	19.9	3.3	5.4	16.3	8.4	1.2

Figure 3: Fuel treatment on Block 217: on plot 3 (west), after falling and skidding but before piling and burning (left); and nearby after piling and during burning (right).

The sawlogs removed from the site were weight-scaled, and the total volume sold was 58.71 m^3, or 15.5 m^3/ha. Non-merchantable debris removed from the site has been measured, and will be reported through future publications by FERIC.

Burning was carried out in March 2006, in compliance with smoke management objectives for the local airshed. Burning was restricted to those days when venting was good and the venting forecast for the following day was also good.

Project Outputs

- Reduced fire hazard for the residents of Green Valley Estates and for the UBC/Alex Fraser Research Forest
- Site for water storage created by 150 Mile House Volunteer Fire Department
- "FERIC Advantage Report" detailing work productivity and impacts on fuels (pending)
- Contribution to local interface fire planning
- Contribution of this experience (one approach on a single site) to the provincial pool of experiences
- Tour of Fuel Management Specialists from Protection Branch, MoFR before treatment (summer 2005)
- Demonstration site for technical and public audiences

Summary of Expenditures

A summary of the costs of this project is shown in Table 2. Approximately half of the cost of the project relates to the conduct of the research and reporting, and should not be considered an integral part of the project when considering the cost of treatment. Never the less, the cost of treatments on this project were high, averaging more than $3,400/ha net of log revenues. Contributing factors to this cost include:

- Small block area (3.8 ha net area) – a larger area would have spread the fixed costs (e.g. planning, public input, roads) further.
- Extensive public input (11% of cost of the project was spent on interaction with neighbours).
- Low timber sales receipts – the total value of the logs only covered 25% of the logging and piling cost, because of
    - Low volume production – due to the input from neighbours we marked the stand very lightly, and only removed 15 m^3/ha; a heavier cut (up to 30-50 m^3/ha) would have improved the economics and still achieved the mule deer objectives, but impacted the neighbours more negatively.
    - Low value of the logs produced – sawlog selling prices are at a 20-year low due to the flood of timber available on the market due to mountain pine beetle.
- Very aggressive fuel treatments, reducing the surface fuels in the stand to very low levels (34% of the cost was spent on piling, lighting and re-piling debris, not counting the debris that was moved by the skidders).

Table 2: Summary of project cost for Block 217 fuel treatment project

Function	Activity	Total
Planning	Community	$1,428.00
	Marking	$805.60
	Prescription	$440.11
Planning Total		$2,673.71
Log&Pile	Brokerage, Stumpage	$98.33
	Falling	$2,075.00
	Piling	$2,400.00
	Skidding	$5,418.75
	Supervision	$420.03
	Timber Receipts	-$2,788.51
	Trucking	$749.82
Log&Pile Total		$8,373.42
Burn and Re-pile	Manual light, re-pile, re-light	$1,777.00
	Machine re-pile	$225.00
Burn and Re-pile Total		$2,002.00
Report	Data Collection	$12,107.60
	Review and Edit	$100.00
	Writing	$982.40
Report Total		$13,190.00
Grand Total		$26,239.13

Conclusions

Although seemingly expensive, the costs we experienced on this fuel treatment project were within the range of costs experienced on similar projects in B.C.[5], and Colorado (Steelman *et al*. 2004). We submit that some stands are critically important for interface fire hazard reduction. Block 217 is a small piece of ground bordered on one side by private land in subdivision, and on the other side by a major forest road; keeping this stand in a low-fuel condition greatly reduces the risk of a fire spreading from the Research Forest into the subdivision, and from the subdivision into the Research Forest. It is our assessment that such expenditures are warranted on some areas, such as block 217.

There are steps we could take to reduce the treatment costs:

1. Treat larger areas to reduce the fixed costs of planning. If, for example, Block 217 had included 20 ha of treatment area east of the Big Meadow Road, our fixed planning costs would have been nearly the same, but divided over a larger area.
2. Harvest more timber volume to increase the timber revenues to underwrite the cost of treatment. Balance this off against the maintenance of a low understory biomass in the future. Harvesting more timber will result in more open conditions, allowing more growing space for flammable grasses and regeneration in the understory, which will carry a fast-burning surface fire. Harvesting less timber should result in less understory, but generates less timber revenue.
3. Limit the intensity of the fuel reduction treatment, thereby reducing the cost of treatment.
4. Consider piling more debris in the stand rather than moving it to the landing, if the risk of pile ignition is low. However, heavier fuels will require more labour for hand piling.
5. Vary treatments across a block. Treatment intensity can be varied throughout a project area in recognition of the particular fire control objectives and physical realities of the project. In this way the relatively small area requiring the most intensive treatment is backed up by a larger area receiving less intensive/more efficient treatments.

This case study was a valuable learning opportunity regarding fuel management in the urban-wildland interface, both at the regional and provincial scale. The sensitivity of neighbours to the idea of even small changes in their immediate environment suggests that further efforts will be required to ensure residents of interface areas will be supportive of fuel-reduction projects. Education regarding fire risk, as well as demonstration of what areas look like after treatment will be helpful. UBC/Alex Fraser Research Forest welcomes visitors to the demonstration site resulting from this project.

[5] Experienced costs for similar treatments in the vicinity of Cranbrook have ranged between $1,000 and $5,000/ha depending upon stand/fuel conditions and topographical constraints on mechanical operations; mechanical treatments are costing in the range of $3,750/ha over 70 ha adjacent to Cranbrook (R.W. Gray, personal communications).

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