C5 FOREST MANAGEMENT PLAN 2006–2026

APPENDIX 10B. WILDFIRE THREAT ANALYSIS
C5 FMU

Lost Creek Fire 2003.

WILDFIRE THREAT ANALYSIS

Lost Creek Fire 2003.

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FIRESMART MANAGEMENT

FireSmart seeks to mitigate large, high intensity, high severity wildfires and incorporate natural disturbance. Designing a FireSmart landscape by integrating fire, forest and land management planning activities is the cornerstone of protecting a multitude of values, achieving public safety, meeting planning objectives, and ultimately achieving sustainable forest management.

Through a Landscape Fire Assessment both the positive and negative impacts of fire can be assessed. A Fire Regime Analysis seeks to define how fire activity or fire pattern has historically characterized the landscape. Such information helps to guide forest management strategies and practices, and prescribed burn programs in a way that remains in line with natural disturbance patterns (Rogeau 2004). The negative impacts of fire will be evaluated through analysis of the Wildfire Threat Model outputs (fire behaviour potential, fire occurrence risk, values at risk, and suppression capability). To further support these findings the Canadian Wildland Fire Growth Model (Prometheus) will be utilized to assess spatial fire behaviour on the landscape through predicting fire growth and associated rates of spread under various planning scenarios.

WILDFIRE THREAT ASSESSMENT MODEL

The Wildfire Threat Assessment Model will provide an analysis as to what effect the Preferred Forest Management Strategy will have, in achieving fire management objectives, on the current and future forest state within the C5 Forest Management Unit. The FireSmart management objectives seek to reduce the wildfire threat potential through:

- Reducing fire behaviour potential
- Reducing fire occurrence risk
- Reducing threat to values-at-risk
- Enhancing suppression capability.

C5 WILDFIRE THREAT ANALYSIS

The analysis will focus on the fall season, as it is representative of the highest degree of wildfire threat according to the model. This can be attributed to the relationship between fire occurrence risk and fire behaviour potential because the values-at-risk and suppression capability layers are not influenced by seasonality.

Assessing what influence the preferred forest management strategy has had on the overall wildfire threat potential within the C5 forest management unit will require that the analysis look at how the spatial harvest sequence has contributed to a percent reduction in fire behaviour potential at both the landscape (both active and passive land areas) and community zone levels. The analysis will indicate how much area (hectares) of high and extreme rated forest structure is being removed from the landbase through a percent reduction in fire behaviour potential.

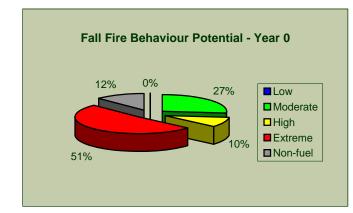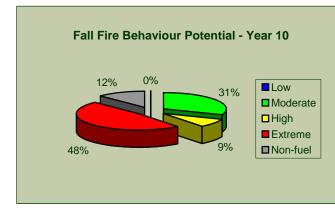# LANDSCAPE WILDFIRE THREAT ANALYSIS FOR C5 FOREST MANAGEMENT UNIT

Figure 1. Fire behaviour potential, for the C5 forest management unit, in the absence of a Preferred Forest Management Strategy.

C5 Landscape: Year 0	
Fire Behaviour Potential Area (ha)	
Low	0
Moderate	93234
High	34551
Extreme	178575
Non-fuel	43662

Figure 2. Forecasted fire behaviour potential resulting from 10 years of spatial harvest sequencing.

C5 Landscape: Year 10	
Fire Behaviour Potential Area (ha)	
Low	0
Moderate	108134
High	29808
Extreme	168448
Non-fuel	43632

Figure 3. Forecasted fire behaviour potential resulting from 20 years of spatial harvest sequencing.

C5 Landscape: Year 20	
Fire Behaviour Potential Area (ha)	
Low	0
Moderate	120030
High	28843
Extreme	157535
Non-fuel	43614

Figure 4. Forecasted fire behaviour potential resulting from 30 years of spatial harvest sequencing.
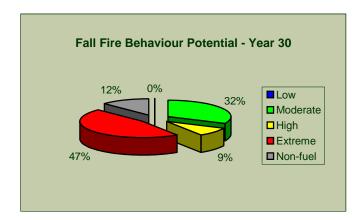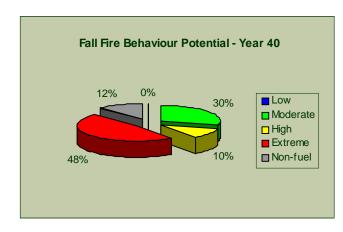

C5 Landscape: Year 30	
Fire Behaviour Potential Area (ha)	
Low	0
Moderate	111567
High	31454
Extreme	163370
Non-fuel	43605

Figure 5. Forecasted fire behaviour potential resulting from 40 years of spatial harvest sequencing.

C5 Landscape: Year 40	
Fire Behaviour Potential Area (ha)	
Low	0
Moderate	104170
High	35484
Extreme	166766
Non-fuel	43602

It can be concluded that the spatial harvest sequence will have a reduction in the extreme and high hazardous fuel types and in doing so, reduce the fire behaviour potential on the lansdscape.
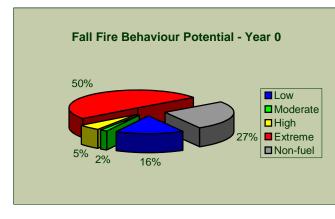
A comparison between Figure 1 and Figure 3 will show there is a significant percent reduction in both the extreme (-5 %) and high (-2 %) fire behaviour potential within the first 20 years. This reduction in fire behaviour potential can be attributed to the spatial modification in forest structure, the removal of 21,040 hectares of extreme rated and 4,743 hectares of high rated forest fuel, as a result of the harvesting activities proposed by the spatial harvest sequence over that time period.

A comparison between Figures 3, 4 and 5 will show an increase in fire behaviour potential over the next 20 year increment up to year 40. This increase in the extreme (+2 %) and high (+2 %) fire behaviour potential rating is a result of the initial harvested forest areas aging over time, thus evolving back to a more hazardous fuel characteristic. The substitution of this new fuel complex

into the overall forest structure has therefore increased fire behaviour potential to a certain degree. There is, however, still a net reduction in fire behaviour potential (-3 %) and a hazardous forest fuel reduction by –11,809 hectares in the extreme rated forested area with a slight increase in high rated hazardous forested area by +933 hectares.

LANDSCAPE WILDFIRE THREAT ANALYSIS FOR C5 COMMUNITY PROTECTION ZONE

Figure 6. Fire behaviour potential within the Community Protection Zone (CPZ) of the C5 forest management unit in the absence of a Preferred Forest Management Strategy.
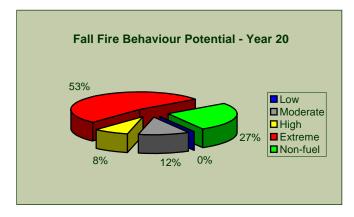

Community Protection Zones: Year 0	
Fire Behaviour Potential Area (ha)	
Low	16743
Moderate	1575
High	5353
Extreme	52066
Non-fuel	27496

Figure 7. Forecasted fire behaviour potential within, Community Protection Zones (CPZ), resulting from 10 years of spatial harvest sequencing.

Community Protection Zones: Year 10	
Fire Behaviour Potential Area (ha)	
Low	0
Moderate	12299
High	8670
Extreme	54768
Non-fuel	27496

Figure 8. Forecasted fire behaviour potential within, Community Protection Zones (CPZ), resulting from 20 years of spatial harvest sequencing.

Fall Fire Behaviour Potential - Year 20

Community Protection Zones: Year 20	
Fire Behaviour Potential Area (ha)	
Low	0
Moderate	12402
High	8670
Extreme	54672
Non-fuel	27489

Figure 9. Forecasted fire behaviour potential within, Community Protection Zones (CPZ), resulting from 30 years of spatial harvest sequencing.

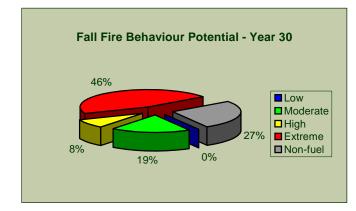**Fall Fire Behaviour Potential - Year 30**

Community Protection Zones: Year 30	
Fire Behaviour Potential Area (ha)	
Low	0
Moderate	19470
High	8497
Extreme	47786
Non-fuel	27480

Figure 10. Forecasted fire behaviour potential within, Community Protection Zones (CPZ), resulting from 40 years of spatial harvest sequencing.
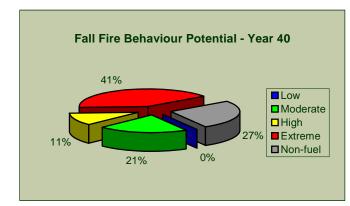
Fall Fire Behaviour Potential - Year 40

Community Protection Zones: Year 40	
Fire Behaviour Potential Area (ha)	
Low	0
Moderate	21703
High	11735
Extreme	42315
Non-fuel	27480

It can be concluded that the planned harvesting activities will generate a reduction in the extreme and high hazardous fuel types and in doing so reduce the fire behaviour potential of the two community protection zones within the C5 forest management unit.
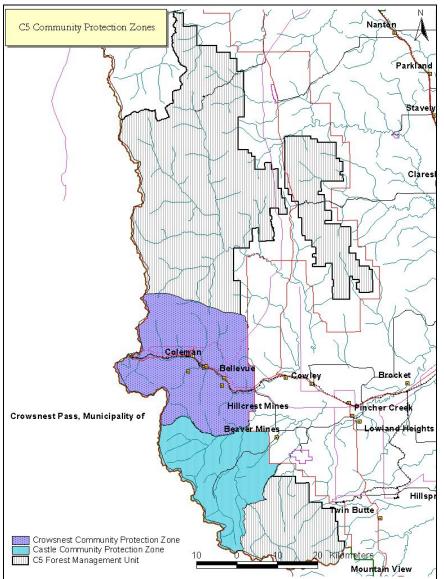

Figure 11. Community Protection Zones within the C5 Forest Management Unit

A comparison between Figure 6 and Figure 8 will show that there is an increase in both the extreme (+3 %) and high (+3 %) fire behaviour potential within the first 20 years. This can be attributed to the large landscape disturbance resulting from the 2003 "Lost Creek Fire". The disturbance has been classified as being non-fuel and has been removed from the active (net) landbase. The presence of a substantial passive (noncommercial) landbase within the community protection zone does not allow for forest structure disturbance through planned harvesting

activities. This is evident from the marginal increase in extreme (+2,606 hectares) and high (+3,317 hectares) rated forested area as it relates to fire behaviour potential.

A comparison between Figure 8, Figure 9, and Figure 10 identifies a significant percent reduction in the extreme (-12 %) and marginal increase in the high (+ 3 %) fire behaviour potential. This disturbance pattern supports the reduction of forest structure (-12,357 hectares) that contributes to extreme rated fire behaviour potential.

There is an overall net reduction (-9 %)in extreme fire behaviour potential within the Community Protection Zones over the 40 year time period for which this analysis concluded. Accomplished through the removal of 9,751 hectares of extreme rated forest structure.

There is an increase in the high rated fire behaviour potential (+6 %) within the Community Protection Zones. This increase is a result of the aging of forest structure within the areas disturbed by planned harvesting activities that are consistent with the spatial harvest sequence.

The inverse relationship between the progression of hazardous fuel characteristics over time within this spatial and temporal context is to be anticipated. To what degree within proximity to an identified value-at-risk is a key factor to be considered when evaluating the effectiveness of the preferred forest management strategy in achieving fire management objectives. It is the spatial and temporal distribution relative to the value-at-risk, on the landscape, and how the harvest sequence supports a reduction in the values overall wildfire threat potential that is of significance to achieving fire management objectives.

WILDFIRE THREAT ANALYSIS OF PASSIVE LANDBASE WITHIN THE C5 FOREST MANAGEMENT UNIT

"The passive landbase within the C5 FMU refers to those land areas that do not contribute to the active (net) landbase, and in which commercial timber harvesting is not foreseen during the life of the C5 FMP" (C5 Forest Management Plan Glossary, 2006).

Wildfire Threat Analysis is performed on those land areas that are passive and for which there is no expectation of planned harvesting activity that will contribute to the reduction of wildfire threat potential. The results of the analysis will determine to what degree the passive landbase is impacting overall wildfire threat potential through the existence of forest structure that has high and extreme fire behaviour ratings.
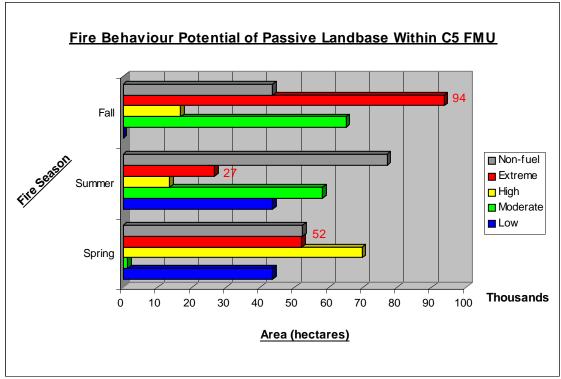
Fire Behaviour Potential of Passive Landbase Within C5 FMU

Figure 12. Fire Behaviour Potential of passive landbase by fuel classification (ha).

It can be concluded that a large portion of the passive landbase (94,000 ha) consists of forest fuel characteristics (current forest state) that rate as having extreme fire behaviour potential. It therefore can be suggested that the passive landbase is having a significant influence on overall wildfire threat potential within the C5 forest management unit.

In the absence of planned commercial timber operations within the passive landbase, and the subsequent landscape disturbance that such harvesting activities provide, it will be necessary to address this fire behaviour concern through alternative methods. Potential prescribed fire opportunities are the likely option. Prescribed fire serves to enhance the positive attributes of fire (i.e. hazard reduction, forest health, forest productivity, ecological restoration, and habitat development) by emulating landscape patterns historically created by natural disturbance.

C5 ANALYSIS ASSUMPTIONS/LIMITATIONS

- The "Lost Creek Fire" in 2003 consumed a large tract of forested area thereby creating a large disturbance within the C5 Forest Management Unit. This large landscape disturbance is represented as being nonfuel within Alberta's Fire Behaviour Potential Fuel Grid Layer. This analysis does not take into account the impact that this nonfuel will have on fire behaviour potential outputs that over time will succeed into fuel characteristics representative of high and extreme fire behaviour potential ratings.

OUTCOME OF C5 PREFERRED FOREST MANAGEMENT STRATEGY ON ACHIEVING FIRE MANAGEMENT OBJECTIVES

- The Wildfire Threat Analysis performed on the Preferred Forest Management Strategy designed for the C5 FMU has achieved a percent net reduction on fire behaviour potential at both the landscape and community zone levels.

- In the absence of planned commercial timber operations within the passive landbase, and the subsequent landscape disturbance that such harvesting activities provide, it will be necessary to address this fire behaviour concern through alternative methods. Potential prescribed fire opportunities are the likely option. Prescribed fire serves to enhance the positive attributes of fire (i.e. hazard reduction, forest health, forest productivity, ecological restoration, and habitat development) by emulating landscape patterns historically created by natural disturbance (Refer to Objective 20).

- In the future it will be necessary to address the large track of forested area that was impacted by the 2003 Lost Creek Fire as the fuel complex will have aged back into a hazardous forest fuel structure.