



Silvicultural Regimes for Fuel Management in the Wildland Urban Interface or Adjacent to High Landscape Values - Guidance

Scope

This guidance covers silviculture activities by Forests For Tomorrow (FFT) within the Wildland Urban Interface¹ or adjacent² to identified high landscape values.

The main focus of the FFT funded silviculture activities within these areas will be on future timber production, however, modification of treatment prescriptions will be employed to reduce current and future wildfire hazard where possible

1. Introduction

Silvicultural treatments can be used to influence stand structure which, in turn, can influence wildfire behaviour and severity. There is a potential to use stocking standards (including species choice), site preparation, thinning, and pruning (*not yet eligible under FFT*) as tools to reduce or modify surface, ladder, and canopy fuels.

2. Purpose and Objectives

The purpose of this Ministry of Forests, Lands, and Natural Resource Operations (FLNR) Silvicultural Regimes for Fuel Management in the Wildland Urban Interface guidance is to provide direction on modifying silviculture regimes when they occur within the wildland urban interface or adjacent to identified high landscape values to reduce wildfire impacts while still targeting the primary objective of future timber production.

The secondary objective is to direct that, **where feasible and ecologically appropriate to do so, FFT silviculture activities undertaken within the wildland urban interface or adjacent to identified high landscape values will use regimes that minimize current and future wildfire hazard.**

3. General Principle

Altering tree species composition and/or reduction in aerial and/or ground fuels coupled with adequate tree crown base height management generally results in fires, should they occur, of reduced intensity and reduced likelihood of crown fire. Resulting surface fires of reduced intensity are generally easier to control and may result in less damage to values at risk as well as the stand itself.

¹ The wildland urban interface is any area where combustible wildland fuels (vegetation) are found adjacent to homes, farm structures or other outbuildings. Typically, the wildland urban interface is defined as an area within 2 km of a community, however, for the purposes of modifying treatments to reduce wildfire risk and hazard the zone will encompass those FFT treatments within 10 km of a community

² In reference to wildfire planning adjacent means within 10 km a community (community zone) or an area identified as having a high landscape values

<https://www.firesmartcanada.ca/images/uploads/resources/chapter1.pdf>



The complete elimination of hazard is not practical or possible.

Treatment practitioners need to be fully aware of any applicable requirements from the wildfire act and associated regulation. These requirements range from conducting treatments during periods of high fire danger to hazard assessment and abatement.

4. General Guidance

All activities that occur within the wildland urban interface or adjacent to high landscape values should be undertaken in consultation with your local fire and fuel management specialists.

The following site-specific factors should be considered when determining the amount of risk inherent in a site and the potential strategies to, if necessary, reduce this risk:

Location: Proximity to people or other resource values, biogeoclimatic zone, degree of isolation, proximity to unabated hazards.

Access: Ease of access, amount of travel in area, existing or future deactivation. Roads for example often increase the likelihood of ignitions but at the same time increase access for suppression crews and so have a mixed effect.

Slope: Steeper slopes increase the rate of fire spread as the fire moves uphill and may reduce the rate of fire spread as a fire moves downhill..

Aspect: South and West slopes are generally more hazardous as fuels generally dry faster and may be dry for longer periods of time..

Block size: Larger openings create more contiguous slash unless mitigated.

Kind, Amount and Distribution of Fuels: Contributions of fuels of different size classes to fire behaviour vary. Fine fuels dry more rapidly, are generally more combustible and generally contribute the most to fire spread. Heavier fuels dry more slowly and generally act to increase fire intensity. Total fuel loading can contribute to both fire spread and intensity and is reflected in the total amount of slash which often increases with stem size and as more stems are felled. Slash depth can be influenced by falling pattern. Continuous distribution of fuels generally increases fire spread. (see [A Guide to Fuel Hazard Assessment and Abatement in British Columbia](#))

Species: Moisture content plays a major role in combustibility as can the presence or absence of flammable compounds that increase combustibility. Both of these factors as they relate to combustibility and fire intensity is impacted by tree species. In reducing order of combustibility: cedar, pine, fir, spruce/balsam, hemlock, and deciduous.



Time: Slash loading reduces over time; the rate of decay varies by site parameters such as Biogeoclimatic classification, slope and aspect along with the kind, amount and distribution of fuels .

When prescribing activities in wildland urban interface or adjacent to high landscape values consideration to reduce wildland fire hazard should be given to:

❖ **Stocking Standards:**

➤ **Species selection**

- Where appropriate, deciduous stocking standards provide an opportunity to regenerate with low to very low flammability species such as Aspen, Poplars, Maple, and Birch. The higher moisture content of deciduous trees and deciduous foliage generally reduces the intensity of a fire and the degree of crown fire involvement.
- Mixedwood stocking standards would allow a component of more valuable coniferous volume to be produced on the site while still reducing fire intensity and reduced flammability of crown fuels with higher moisture content deciduous species.
- Fire Resistant/Tolerant coniferous species, such as Py, Pw, Fdi, Lw can be regenerated in fire maintained ecosystems.

➤ **Density and Inter-tree distance**

- Density and inter-tree distance can be used to influence surface, ladder, and crown fuels.
- Widely spaced trees can reduce both the bulk density of foliage within the crown layer and the continuity of crown fuels. Widely spaced trees, however, often lead to an increase in surface fuels such as grass and shrub species and result in a reduction in height to the base of the crown. There is also a potential for an increase in ladder fuels as younger tree establish naturally. Surface fires as a result of widely spaced trees are often less threatening than crown fires.
- Densely spaced trees can have higher crown closures, and inter-tree competition can increase leading to suppressed or dead standing trees that can act as ladder fuels. Tightly spaced trees are more likely to self prune, resulting in greater heights to the base of the crown. Tightly spaced trees may also support, more dangerous and hard to control running crown fires.
- Density can be manipulated to provide a shaded fuel break³, which provides shade and moisture to reduce the drying of fuels. The breaks can be used to

³ Shaded fuel break is an area within a forestland that has been treated or managed to remove or decrease fuel loads. Heavy underbrush and fallen limbs are generally removed, leaving mature trees that are more fire resistant. This creates a break in vegetation, which slows the speed of wildfire and



prevent running crown fires and provide for safe effective control of surface fires.

❖ Thinning/Spacing

➤ Juvenile thinning/spacing

- Provides an opportunity to influence density and espacement which in turn influences crown fuel bulk density and continuity.
 - *The amount of fuel loading and continuity of fuels resulting from thinning depends very much on the initial density and tree size as well as the pattern in which the trees are felled.*
- Thinning of smaller material reduces the vertical continuity of fuels and reduces ladder fuels.
- Generally requires additional treatment to remove thinned materials as results in an increase in surface fuels, and treatment to maintain the gap between surface and crown fuels due to changes in microclimate.

➤ Intermediate cuts/Commercial thinning

- Provide an opportunity to remove merchantable material that may cover part or all of the cost of treatment
- Provides an opportunity to select the species that are left behind. Older trees of fire resistant species (Fdi, Py, Pw, Lw) with high height to the base of the live crown can be preferentially left.
- Crown continuity and bulk density can be reduced.
- Ladder fuels such as suppressed or dead standing trees can be removed if the thinning is “from below”.
- Depending on retained density can result in a “stocked” stand that is still producing coniferous sawlogs.
- May result in a change in microclimate that lead to decreases in surface fuel moisture and relative humidity which can in turn increase surface fire intensity. This may necessitate the maintenance of the gap between surface and crown fuels.

❖ Site Preparation

- An opportunity to manage fuel quantities and continuity.
 - *It is important to recognize that excessive fuels treatment/removal is neither feasible nor desirable. The retaining of some amounts and*

provides firefighters with a safe zone. Shaded fuel breaks may or may not include pruning but often leave behind “pruned” (high CBH) trees. There are circumstances where this is likely better than wide spacing.



distributions of different size fuels provides a host of ecological benefits. It is important to work with the appropriate specialists (e.g. fuels, fire, wildlife, etc) to determine what is optimal.

- *The amount and distribution should compliment rather conflict with other values. For example, slash should not be allowed to be piled against retention for if that slash burns the retention is unlikely to survive*

➤ **Prescribed fire**

- Provides an opportunity to influence both surface and ladder fuels.
- Less predictable as a tool to influence stand structure.
- Reduces the cover of flammable surface vegetation and the amounts of fine woody debris, and large woody debris.
- Can consume lowest ladder fuels and scorch lower branches leading to increased crown base heights.
- May cause damage and mortality in residual stand if improperly conducted

➤ **Mechanical site preparation**

- Machinery can be used to remove large woody debris post harvest reducing surface fuels.

❖ **Pruning - not yet eligible under FFT**

- Pruning increases the height to the base of the crown and reduces the likelihood of a crown fire.
- Pruning can also increase the value of a stand.

It is unlikely that any one silvicultural treatment will be sufficient; in most cases a combination of treatments will be necessary in order to address all fuel layers. In addition, maintenance of fuel breaks will be required as stands grow and in-growth occurs. Depending upon timing and location (adjacency) of different treatments, fuel breaks may “move” as one site – after treatment - may act as a fuel break where before treatment an adjacent site acted as a fuel break. Fuel breaks do not have to be static - assigned to one specific area.

Care must also be taken to ensure that the resultant debris from some treatments (e.g. thinning) do not increase fire hazard⁴ and risk⁵. Proper debris management is an essential component of reducing the risk of severe fire behaviour.

5. Strategies to reduce fire probability

⁴ **Fire Hazard** is a function of the fuel loading

⁵ **Fire Risk** is an estimation of uncertainty that a fire will not occur



When reviewing the options, the benefits of hazard reduction must be weighed against the costs. Some costs are minimal and easily incorporated while others are significantly higher to minimize hazard. Not all costs are necessarily direct contract costs. By foregoing or rescheduling treatments, there may well be opportunity costs to stands or portions of stands in terms of stand growth foregone. The aim is to achieve an acceptable standard of hazard reduction by using combinations of fuel modification, risk reduction and prevention strategies. Consider the following factors when developing a strategy to reduce the amount of risk created and the duration of the risk.

Access restriction: Deactivation or temporary road closures.

Prevention: Signs, forest closures, campfire bans or increased patrols.

Treatment block size: Size of openings can be limited where applicable.

- Continuous disturbed areas should be separated by fire resistant areas that are no less than 400 m in width

Treatment block configuration: Configuration of treatment blocks could be planned to minimize the risk of loss to fire. Directions on block configuration, buffer strips, and roadside fuel may be contained within a [Community Wildfire Protection Plan](#), if applicable. As an alternative one can work with the local fire and fuels management specialists to help with block configuration on the landscape to minimise fire hazard and risk to investments/values.

- **Buffer strips:** Untreated strips can be left along roads.
 - The need for, and width of, the strip would vary depending on the severity of the hazard and the amount the road is used. Widths could vary from 5 to 20 metres. The strip is usually measured from the edge of the road running surface. Use roadside features such as cutbanks as natural buffers where possible.
- **Roadside fuel reduction:**
 - The width of the strips varies from 0 to 20 metres measured from the edge of the road running surface and is dependent on the amount of road use in the area.
 - Slash can be pulled to road side and burned or chipped. Slash can be pulled into the block.

Fuel modified in block:

- Lop and scatter to reduce fuel depths. Slash depth should be measured from the ground to the stem. This is an important cost item in heavy slash and specifications should not be unreasonable. A reasonable target may be an average one metre slash depth, however, the prescribed depth will depend on the direction resulting from [A Guide to Fuel Hazard Assessment and Abatement](#)



[in British Columbia](#). There may also be the option to seek an amendment to requirements under the wildfire act and regulation from the local fire centre. Irrespective slash left on block should not hinder adequate natural reforestation and/or planting opportunities

- Under burning or burning of slash during low hazard.
- Directional falling within the block to reduce fuel depths.
- Directional falling into the block at the block perimeters. Falling into the block will reduce the amount of fine fuels near roads and adjoining areas.
- Utilization of some of the slash during low fire danger (e.g., for firewood or post and rails).

6. Supporting tools/Information

❖ **TIPSY**

- Under custom view you can select; "Mean Crown Height to Base" and "Crown Bulk Density". Crown bulk density, canopy base height, and the amount of forest floor fuels coupled with weather determine whether a fire is likely to be a ground or crown fire. There is software that uses these inputs to determine fire type or alternatively one can use a standard FBP fuel type if one matches the stand under consideration and the associated fire behaviour described in the fuel type. However, with stand structure and the development of stand structure through time information the prescribing practitioner can get a better sense of a treatment's longevity from a fuels perspective.

Note: TIPSY does not quantify forest floor fuels and as a result on site or other (e.g. BEC) estimates need to be used.

❖ **Community Wildfire Protection Plan (CWPP)**

- A Community Wildfire Protection Plan is a plan developed by a community that:
 1. defines risk areas within the community for interface fires
 2. identifies measures necessary to mitigate those risks
 3. outlines a plan of action to implement the measures

A CWPP generally has two major components:

- A Report – that outlines the community, the goals of the plan, assessed risks, and the proposed plan to address the risks
- Maps – that outline the community, landownership, and hazards.

❖ **Landscape wildfire planning and management**

- Landscape fire planning and management extends fire management initiatives from the Wildland Urban Interface of municipal lands adjacent to communities, to provincial forests to further mitigate impacts to communities, critical infrastructure and natural resource values.



7. Fire and Fuel management Contacts

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8. Additional Information

[Wildfire Act](#)

[Wildfire Regulation](#)

[A Guide to Fuel Hazard Assessment and Abatement in British Columbia](#)

[Spacing guidebook](#)

[Science Basis for Changing Forest Structure to Modify Wildfire Behaviour and Severity – USDA](#)

[Rating Interface Wildfire Threats in British Columbia](#)

[BC Fire Smart](#)

[Reducing Fire Risk on Your Forest Property](#)



[Evaluation of Silvicultural Treatments and Biomass Use for Reducing Fire Hazard in Western States](#)

[Alberta Sustainable Resource Development - Forest Fuels Management and Biomass Utilization Bibliography](#)

[CFIS](#) and Canadian [FBP](#) System references.