

Chief Forester Forest Management Options for Reducing Slash Pile Burning:

BEST MANAGEMENT PRACTICES

JUNE 2023

Purpose

To create less waste, reduce green house gas emissions, and utilize more fibre through the development of guidance for forest management (harvest and silviculture) practices that minimize slash pile burning.

Background and Context

Currently there is an initiative within the Ministry of Forests (FOR) to develop policy ideas for reducing slash pile burning with the **intent of creating less waste, reducing carbon emissions, and utilizing more fibre**. Engagement sessions have occurred with Industry, Local Government and First Nations. Further policy development has been tasked to BC Wildfire Service, BC Timber Sales, Timber Pricing Branch, and the Office of the Chief Forester.

Considering the broader objective of enhancing utilization and reducing carbon emissions, the question becomes, what is possible within the forest management (harvest and silviculture) framework. There is no one size fits all solution, nor is there a siloed approach that will result in the desired outcomes. However, the best management practices outlined in this document, can contribute positively to the end goals, and support the concept of forest management as a tool to manage for a diverse range of values.

Considerations

- This is a multi-faceted issue, best management practices must be evaluated within the specific situation they are to be used considering fire risk reduction, maintenance of biodiversity, carbon storage, planter access, harvesting economics and presence of secondary users.
- There is no standardized solution, different options will be available for different harvesting systems, timber types and sites; there are multiple tools in the toolbox for practitioners to effect change.
- The intent is not to be prescriptive, but to focus on the development of strategies in an iterative manner, based on an adaptive management cycle.
- An integrated multi-phase approach, linking planning, operations, and silviculture, will help achieve the desired outcomes.

Proposed Best Management Practices

These recommendations are based on a list of forest management options for reducing slash pile burning that was created through consultation with numerous groups.

Planning Practices

1. Identify potential bioenergy options during the planning phase
2. Promote the use of partial cutting
3. Allow additional wildlife tree retention areas with non-representative species
4. Increase Coarse Woody Debris (CWD) requirements

Silviculture Practices

5. Modify stocking standards:
 - a. to allow for residual trees to contribute to reforestation obligations
 - b. for variation to well-spaced and minimum inter-tree distance
6. Encourage precommercial and commercial thinning

Harvesting Practices

7. Process at the stump
8. Scatter woody material within the block
9. Distribute fine fuels within the block
10. Create windrows or individual small piles (<5m³) for small mammal habitat and biodiversity
11. Pile in a manner that facilitates biomass extraction
12. Haul full trees or long logs from the block



Description of Best Management Practices

Planning Practices

1. Identify potential bioenergy options during the planning phase

Total chance planning (the early planning over an entire development area for the best overall realization of all objectives) is important to maximize logistical efficiency and minimize costs. Factors to consider include how much residue is available, how it will be utilized, how and where it will be transported.

During the planning phase, identify opportunities for shorter sawlogs, pulp logs, bioenergy products (i.e. pellets). It is generally more economical to move 'log-like' residue (i.e., waste, pulp and bioenergy logs) at the same time as the primary harvest. In the case of loose material, long butts and branches, logistical considerations (i.e., vehicle crowding, safety, extra equipment) will often dictate the need for a second entry.

Considerations:

- Ensure process include opportunity for local First Nations participation and considerations
- Integrating secondary fibre processing options where feasible to allow for the option of a Simplified Waste Survey procedure
- Cruise compilation volume for non-merchantable component of the stand and anticipate dispersed CWD
- Proximity to non-sawlog fibre use facility
- Machinery for secondary products: grinders, loaders, chippers, microchippers, horizontal grinders (tracked, wheeled), tub grinder
- Transportation for logging residue: B-Trains, walking floors, bins
- Road system design for efficient processing and transportation, consider road grade and cutslope height limitations to secondary processor
- Depending on the terrain, road building costs to accommodate various types of transportation equipment could be cost prohibitive.
- Deactivation timelines

References to consider during the pre-planning phases:

- Provincial Logging Residue and Waste Measurement Procedures Manual – Interior Version, Amendment No.7 (Ministry of Forests, November 2022)
- Best Management Practices for Integrated Harvest Operations in British Columbia (FPInnovations 2017)
- Biomass Trucks and Resource Road Standards Guidebook (FPInnovations 2011)

2. Promote the use of partial cutting

Increased use of partial cutting regimes will result in more fibre standing, which will reduce the amount of non-merchantable brought to roadside that would potentially be burned.

The use of this approach fits with maintenance of biodiversity objectives, retention silvicultural systems and use of non-clearcut approaches.

Considerations:

- Partial cutting can be more expensive, added costs could act as a deterrent to uptake of alternative practices of dealing with slash as these will also be expensive
- There is the need to ensure practices do not result in highgrading of the most valuable timber
- In cases where burning of residue is the most effective disposal tool (e.g., 150 km from town, in a physically inaccessible area, steep roads), partial cutting can create challenges because of the standing timber left immediately adjacent to the residue piles. This would mean embracing other methods of disposal which could also increase costs.

3. Allow additional wildlife tree retention areas (WTRAs) with non-representative species

Establish additional WTRAs where low value timber (e.g., deciduous, non-merchantable trees etc.) can be used to manage for other resource values (e.g., visuals, wildlife habitat, biodiversity). This reduces the amount of low value timber felled to waste.

This may have a slight THLB impact, but it is likely reasonable if used appropriately as stated above, i.e., focus on deciduous and non merch.

Considerations:

- Blowdown
- Waste and residue

4. Increase Coarse Woody Debris (CWD) requirements

Increasing the requirements for CWD retention promotes non-burning of large logs. Intention is that these are low-value logs that would have been burned to mitigate fire hazard.

Considerations:

- Operators very rarely bring debris to roadside unless they have an interest in processing it
- Measurement of debris levels in the block by operators is challenging (WF software)
- Anticipate low impact on carbon emissions as fine CWD is likely the largest issue – i.e., tops and limbs, neither ideal for CWD and CWD quantification
- Fire hazard

Silviculture Practices

5. Modify stocking standards:

a. allow for residual trees to contribute to reforestation obligations

Allow for residual trees retained to contribute towards achievement of reforestation obligations. This should result in retention of non-merchantable due to size but otherwise healthy and vigorous being felled and contributing to slash levels.

Considerations:

- Blowdown can be an issue
- Species composition may not meet preferred and acceptable requirements
- Deciduous competition may occur
- Impacts to growth and yield
- Forest health can be exacerbated if retained trees have forest health factors i.e., mistletoe

b. for variation to well-spaced and minimum inter-tree distance

Allow for flexibility in the spacing of regeneration being assessed to achieve regeneration obligations. This suggestion will allow for more flexibility with leaving woody debris/slash and retention on the block. This will potentially reduce the amount of slash brought to the roadside for piling.

Considerations: Stocking distribution would need to be monitored

6. Support the use of precommercial thinning and commercial thinning

Remove low quality, suppressed and intermediate trees through precommercial (PCT) and commercial thinning (CT). This option could potentially reduce slash as density dependent mortality could be harvested and removed from the stand. This allows for less non merchantable slash left on site.

Suitability of this option will depend on stand conditions. Generally good sites are the best candidates with relatively high initial stocking, e.g., 1800 stems per hectare (sph), PCT to 1200 sph, then CT to a residual basal area (RBA) of approximately 20m² at approximately year 40. This approach is being tested, as an operational trial, in young pine stands in the Quesnel area where pre and post fire risk reduction is being assessed. This approach could have a significant impact on the need for slash burning.

Considerations:

- Potential for exacerbating the problem by slash loading over multiple entries into the stand
- Lower utilization rates will be required to ensure goal of reducing slash piles is achieved

Harvesting Practices

7. Process at the stump

Process at the stump where possible to reduce the amount of slash brought to roadside. Processing at the stump is appropriate when there is low fire risk and there is no intent to salvage the pulp or tops. Processing at the stump tends to create a large brush mat which can facilitate the movement of wildfires through a cutblock.

Considerations:

- Costs increases
- Slash loading can increase fire risk and reduce plantability

8. Scatter woody material within the block

Scatter woody material to reduce the amount of slash brought to roadside. Fire hazard and plantability must be considered before implementing this approach. It can also have implications for biodiversity and CWD. Woody material defined as greater than 7 cm in diameter or thickness¹.

When spreading Coarse material, the following should be considered:²

1. The placement of material in the block should be prescribed in a manner that reduces costs to the fullest.
2. Material placed in a manner that facilitates planting operations; general rule is to suggest slash less than 20 cm deep.
3. The continuity of material should be broken up periodically to mitigate the possible “wicking” effect (fire behavior).
4. Material should be incorporated into the soil to promote decomposition.
5. Material should not be distributed within 50 meters of permanent access structures or timbered boundaries.

Considerations: Specifications should be shared with machine operators prior to harvest.

9. Distribute fine fuels within the block

Distribute fine fuels within the block to reduce material brought to the side of the road and built into piles. Appropriate in areas with high risk of drought and/or very low biomass post harvest.

Fine materials defined as less than 7 cm in diameter or thickness³

Dispersed fine fuels should be:⁴

1. Placed in a location that machinery rehabbing trails have efficient access to (i.e. along trails)

¹ A Guide to Fire Hazard Assessment and Abatement in BC, April 2012

² From BCTS document, [BCTS Avoided Emissions and Fibre Utilization Strategy \(draft\)](#)

³ A Guide to Fire Hazard Assessment and Abatement in BC, April 2012

⁴ From BCTS document, [BCTS Avoided Emissions and Fibre Utilization Strategy \(draft\)](#)

2. Not be distributed within 50 meters of permanent access structures or timbered boundaries
3. Not vertically or horizontally aligned (dispersed as evenly as possible)
4. Not exceed 20 cm in depth

10. Create windrows or individual small piles (less than 5m³) for small mammal habitat and biodiversity

Other options for managing slash are to create windrows or individual small piles for small mammal habitats and biodiversity. Piled material is considered a debris pile when it is equal to or greater to 5m³ in terms of the air volume occupied by the pile¹.

Mammal Piles should be located as far as possible from permanent access roads, and 50 metres from surrounding timber edges. The best results for small mammals are those oriented in a linear fashion.

Windrows are best for connecting riparian areas to mature forest across a cutblock. They need to have a 10 metre gap every 100 metres to allow for wildlife movement and silviculture activities.⁵

11. Pile in a manner that facilitates biomass extraction

Once biomass is at the roadside consider processing and piling in a way that there is an opportunity for fibre recovery. If timber is processed, decked and stacked in a way that secondary processors have access to it, a market is created for roadside fibre and it can be utilized instead of burnt.

Considerations:

- Keep contaminants out of piles as best possible, avoid dirt (clay and silt) and sand, rock (pebbles and cobble), metal and snow
- Pile residues higher if secondary harvest to occur in winter
- Oriented piles so that tops are lined up (reduces fire hazard as well)
- Best piling practices differ for tops, long butts and brush (reference FPInnovations 'Best Piling Practices')

12. Haul full trees or long logs from the block

This practice results in the fibre being hauled to the logyard, instead of being stranded at roadside. Short log processing creates quite a bit more waste at roadside because length is the determining factor of the processed log instead of top diameter.

⁵ From BCTS document, [BCTS Avoided Emissions and Fibre Utilization Strategy \(draft\)](#)

Decision Matrices

Factors to consider when deciding on appropriate best management practices:

- **Fire hazard:**

Review: A Guide to Fire Hazard Assessment and Abatement in British Columbia

Determine fire hazard dependencies: geographic location, timber type, physical block parameters (i.e. slope and aspect)

Example:

- Is the block within a high fire hazard zone?
 - If no – consider the following:
 - leaving slash distributed on site – crush with machines if possible
 - If yes – consider the following:
 - Create more small piles and leave them on site as small mammal and bird habitat

- **Potential for slash accumulation:**

Review:

1. Cruise compilation for non-merchantable component of the stand and anticipate dispersed CWD
2. Harvest Method
3. District average tables

	Low Risk (<15m³)	Medium Risk (15-45m³)	High Risk (greater than 45m³)
Dry belt m³/ha	DCC, DCS, DMH, DRM, DQU, DSE	DFN, DDKA, DMK, DND, DOS, DPC, DPG, DVA	DKM, DSS
Transition zone m³/ha	DMH, DSE	DCC, DCS, DFN, DKA, DMK, DND, DOS, DPC, DRM, DPG, DQU, DVA	DKM, DSS
Wet belt m³/ha		DCC, DCS, DFN, DKA, DMH, DMK, DOS, DPC, DRM, DPG, DQU, DSE, DVA	DKM, DND, DSS

- **Others**

1. maintenance of biodiversity
2. carbon storage
3. proximity to non-sawlog fibre use facility
4. proposes access both long-term and short-term
5. planter access
6. harvesting economics

Appendix A

Reside and Waste – Interior District Average Waste

Source: [interior_waste_volume_averages_2023.pdf \(gov.bc.ca\)](#)

INTERIOR DISTRICT AVERAGE WASTE												
For Section 4.3.2 where district averages will be used in waste assessments. Effective May 15, 2023												
District	Dry Belt m3/ha				Transition Zone m3/ha				Wet Belt m3/ha			
	Avoidable Sawlog Waste m3/ha	Avoidable Grade Y/4 Waste m3/ha	Unavoidable m3/ha	Total Avoidable Sawlog, Grade 4 + Unavoidable Waste m3/ha	Avoidable Sawlog Waste m3/ha	Avoidable Grade Y/4 Waste m3/ha	Unavoidable m3/ha	Total Avoidable Sawlog Grade 4 + Unavoidable Waste m3/ha	Avoidable Sawlog Waste m3/ha	Avoidable Grade Y/4 Waste m3/ha	Unavoidable m3/ha	Total Avoidable Sawlog, Grade 4 + Unavoidable Waste m3/ha
DCC	2.23	10.23	0.11	12.57	8.38	12.32	0.21	20.91	17.39	20.49	0.12	38.00
DCS	9.84	6.29	0.31	16.44	14.72	14.13	1.02	29.87	14.51	16.93	3.75	35.19
DFN	10.17	4.43	1.03	15.63	16.17	4.43	1.03	21.63	26.17	4.43	1.03	31.63
DKA	5.82	7.66	0.14	13.62	10.68	13.75	0.38	24.81	10.89	13.46	0.22	24.57
DKM	26.12	32.74	1.10	59.96	32.12	32.74	1.10	65.96	42.12	32.74	1.10	75.96
DMH	3.40	12.22	0.04	15.66	9.35	10.80	0.06	20.21	8.34	22.00	0.24	30.58
DMK	15.82	16.82	0.14	32.78	21.82	16.82	0.14	38.78	14.96	17.38	0.22	32.56
DND	6.75	18.84	1.25	26.84	12.75	18.84	1.25	32.84	14.24	30.90	0.92	46.06
DOS	8.54	7.14	0.16	15.84	11.54	10.24	0.10	21.88	11.08	13.31	0.48	24.87
DPC	15.60	17.28	0.41	33.29	21.60	17.28	0.41	39.29	20.83	10.56	0.22	31.61
DRM	4.06	2.43	0.16	6.65	10.96	11.34	0.56	22.86	21.43	32.58	0.12	54.13
DPG	7.44	17.60	0.89	25.93	13.44	17.60	0.89	31.93	16.11	12.88	0.55	29.54
DQU	1.99	2.35	0.02	4.36	14.11	10.94	0.02	25.07	12.28	10.89	0.25	23.42
DSE	7.73	7.18	0.07	14.98	7.79	4.50	0.15	12.44	18.75	11.64	0.47	30.86
DSS	8.46	17.86	2.62	28.94	14.46	17.86	2.62	34.94	16.92	19.82	1.47	38.21
DVA	6.77	21.13	0.17	28.07	12.77	21.13	0.17	34.07	9.54	14.44	0.05	24.03
Weighted Average [TOTAL]	5.22	8.48	0.13	13.82	14.86	16.21	0.59	31.66	17.19	15.57	0.53	33.28

Appendix B

Additional Resources

- Best Management Practices for Integrated Harvest Operations in British Columbia (FPInnovations 2017)
- Biomass Trucks and Resource Road Standards Guidebook (FPInnovations 2011)
- BiOS App for calculating roadside residue (IBIO branch and FPInnovations – under development). Available to the public on Google Play and the Apple App Store. Final product will pair the app with the Ministry of Forests’s FBGIS layer to show available biomass on crown lands.
- Fibre Recovery Process <https://www.for.gov.bc.ca/ftp/HTH/external/!publish/web/timber-tenures/fibre-recoverytenures/Fibre-Recovery-Process.pdf>
- Improving Fibre Recovery: Administrative Guide <https://www.for.gov.bc.ca/ftp/HTH/external/!publish/web/timbertenures/fibre-recovery-tenures/Improving-Fibre-Recovery-Admin-Guide.pdf>
- Provincial Logging Residue and Waste Measurement Procedures Manual – Interior Version, Amendment No.7 (Ministry of Forests, November 2022) res_waste_interior_amend_7_master.pdf (gov.bc.ca)
- Residual Fibre Utilization Policy <Residual Fibre Utilization Policy - Province of British Columbia> (gov.bc.ca)
- Wildfire Management Branch: A Guide to Fuel Hazard Assessment and Abatement in British Columbia https://www2.gov.bc.ca/assets/gov/public-safety-and-emergency-services/wildfire-status/prevention/fire-fuel-management/hazard-assessment-abatement/bcws_hazard_assessment_abatement_guide.pdf
- BCTS Avoided Emissions and Fibre Utilization Strategy – (Draft 2022)