

Fire management/ Wildland Urban Interface (WUI) stocking standards for Selkirk Resource District South Columbia

Prepared for RDCK Collaborative Community Wildfire Protection Planning Group

Prepared by Stocking Standards Committee (Erik Leslie, Dean Christianson, Tyler Hodgkinson, John Cathro)

Background

The RDCK Collaborative Community Wildfire Protection Planning Group was formed early in 2017 to address planning objectives identified in updates to several Kootenay Lake area Community Wildfire Protection Plans. The Collaborative Planning Group is comprised of representatives from FLNRORD, RDCK, City of Nelson, BC Parks, forestry licensees, private land managers, and the West Kootenay EcoSociety.

The objectives of the Group are to:

- Reduce the risk of wildfire within the WUI while protecting social and ecological values;
- Consult widely with local stakeholders to maintain the social license with communities in the WUI;
- Reduce the unit costs of wildfire risk reduction while providing economic benefits and access to timber in the WUI; and
- Develop best management practices to align wildfire risk reduction, timber harvesting and biodiversity maintenance to be used as guidelines for use across the RDCK.

The Collaborative Planning Group has identified fire management stocking standards as a top priority. In March 2017 the development of fire management standards were included in the Group's workplan and a Stocking Standards Committee was formed to develop draft standards.

This document was developed with input from others (including: Bruce Blackwell, Tom Bradley, Deb MacKillop, Selkirk District Stewardship staff).

Chief Forester's Guidance

In February 2016 the Chief Forester of BC sent a Memo to all Fire Centers, Resource Districts, and Forest Licensees to provide guidance on developing stocking standards for fire management. An accompanying Fire Management Stocking Standards Guidance Document was produced.

The Chief Forester's guidance document discusses stocking standard rationales, objectives, and stand structure and composition considerations. It discusses the importance of promoting species that are fire resistant and are ecologically suited to climate change. It also discusses the need for reduced stand densities and for developing stand structures with higher canopy base heights and low canopy bulk densities.

The Chief Forester's guidance on stocking standards foresees the development of both partial cut and clear-cut fire management standards. The CF guidance document indicates a preference for partial cuts while recognizing that partial cuts may not be practicable:

From a silvicultural perspective where practicable, partial cut scenarios with wind-firm, fire resilient species reserved from harvest (i.e. shaded fuel break) are preferred to clear-cut scenarios, for a number of reasons, including: amelioration of fire weather [...]. That being said, it is recognized that in some stand types, clearcutting may be the only practicable option due to tree silvics, disease/ insect issues, and wind firmness (e.g., mature 100% lodgepole pine stands).

The proposed stocking standards described below have been developed based on the principles, approach, and examples provided in the Chief Forester's guidance document. The

proposed standards are similar to other fire management stocking standards developed and approved for use across the BC southern interior and central interior.

Application

These stocking standards are designed to achieve fire management objectives as identified in a fire management plan. They would be available for application within the 2km WUI zone as designated in a CWPP. They could also potentially be applied within landscape-level fuel break areas as designated in a landscape-level fire management plan.

The draft stocking standards described below are intended to be reviewed and approved by the District Manager for inclusion in the list of District stocking standards (DSE South Columbia). These stocking standards would each be assigned their own unique SSID and could be included in any forest licensee's FSP or WLP. The prescribing forest professional would decide whether to apply the WUI standard on any given harvest site.

The following sections describe the standards to be used for fire management partial cut and even-aged stocking standards.

Post-harvest fuel hazard abatement

Post-harvest logging debris is expected to be carefully managed in all areas where fire management stocking standards are applied. Post-harvest fire hazard must be assessed and abated as required by the Wildfire Act and Regulation.

It is highly recommended that use of these standards be tied to additional post-harvest debris and fire spread management including but not limited to piling and burning, fireguard construction, spot or broadcast burn treatments and significant fuel removal or modification by hand or mechanical treatments.

Fire management partial cut (shaded fuel break) stocking standard

Intent and Guidance

These fire management partial cut stocking standards are designed to be applied where sufficient mature, healthy, larger diameter, windfirm, fire resistant trees (e.g., Lw, Py, Fd, Pw, At, Act, Ep) are present in the pre-harvest stand and can be retained to function effectively as a 'shaded fuel break.

Where there are non-windfirm, non-fire resistant or other stand conditions not conducive for creating a partial cut shaded fuel break then even aged fire management stocking standards should be considered.

The intent of this stocking standard is to describe a stand that has generally been thinned from below. Intermediate and suppressed trees and co-dominant trees of less fire tolerant species would be preferentially removed, canopy base height would be increased, and canopy closure would be reduced. Target canopy closure will generally range from ~20% – 40% with target average ~2 – 6 m spacing between crowns.

Fire management partial cut standards areas must have $\geq 12 \text{ m}^2/\text{ha}$ of basal area of preferred and acceptable leave trees in order to not incur a regeneration obligation. A basal area of $\geq 12 \text{ m}^2/\text{ha}$ can be considered a threshold where the retained overstory begins to have a significant impact on the development of understory.

If a minimum of $12 \text{ m}^2/\text{ha}$ of preferred and acceptable leave trees cannot be retained, then the partial cut standard would not apply. In situations where basal area retention is $< 12 \text{ m}^2/\text{ha}$, the even-aged (regeneration) fire management stocking standards must be applied¹.

If greater than $22 \text{ m}^2/\text{ha}$ of acceptable Layer 1 trees will be retained post-harvest, then the

¹ The rationale for the DSE South Columbia Default Stocking Standards (April 2018) suggests that even-aged standards should be used where $< 12 \text{ m}^2/\text{ha}$ of basal area is retained.

resulting stand may be considered sufficiently stocked in the overstory for intermediate cut stocking standards to be applied. Intermediate cut definitions are as per FPPR and WLPPR.

For these fire management partial cut standards, a survey must be conducted between 1 and 3 years post-harvest to determine if sufficient acceptable leave trees are present to meet the standard. Acceptability criteria for tree form and health are included in the standards in a manner similar to that used for intermediate cuts.

The standard described below was designed in recognition that pre-harvest stand conditions are highly variable and that stocking standards will not likely be effective or widely deployed if they

Fire management partial cut standard: SSID# 1062309

Retain a minimum of 12 m²/ha of healthy mature trees.

Acceptable leave trees must be dominant or co-dominant layer trees >17.5 cm dbh, and:

- > 25% live crown with no indicators of decline;
- Free of gouges and wounds > 1/3 of stem circumference; and
- Free of wounds on a supporting root within 1 m of the stem.

Preferred leave trees include fire resistant species (i.e., Lw, Py, Fd, Pw, At, Act, Ep) that are likely to be windfirm. Other species are acceptable where no fire resistant species of suitable form and health are available and prescribing a WUI treatment has been deemed appropriate. Prescribers should consider Forest health and climate change issues if prescribing to leave other tree species, of note would be Lodgepole pine which is a shorter rotation species, subject to Mountain Pine Beetle and likely not a good longer term fuel break species choice – blowdown, etc. Broadleaf species are included as they are generally less flammable than other coniferous species and as a result may reduce fire behaviour.

are too prescriptive and/or detailed. Professional judgement is essential and innovation should be encouraged. The standard is however designed to be verifiable and includes some quantitative measures.

Geographically this standard is currently restricted to Arrow, Boundary and Kootenay Lake Timber Supply Areas

These partial cut standards are intentionally broad to encompass the variability of existing stand composition and structure in the South Selkirks.

Fire management partial cut example 1—Submesic/ subxeric FdPy site with lower density of larger trees

Volume removed: 60%

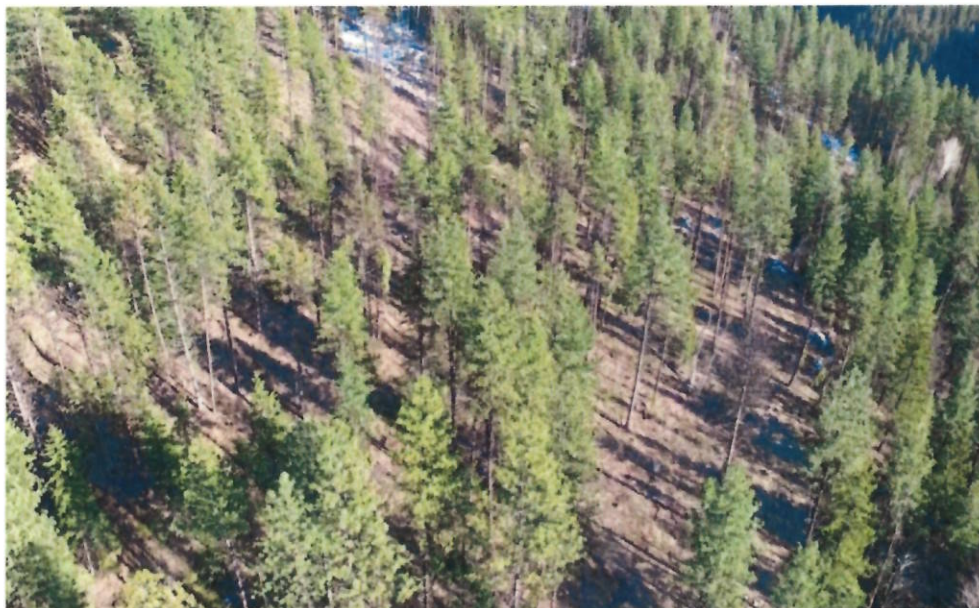
Residual basal area: 14 m²/ha

Stand density: ~90 sph

Average stand diameter: 45 cm

Average crown width: ~6.5 m

Residual crown closure: ~25%



Shaded fuel break in PyFd stand in Winlaw Creek ICH dw1 103 (102)

Fire management partial cut example 2—mesic FdHwCw(At) site with higher density of smaller trees

Volume removed: 50%

Residual basal area: 20 m²/ha

Stand density: ~280 sph

Average stand diameter: 30 cm

Average crown width: ~4 m

Crown closure: ~35%



*Shaded fuel break in FdHwCw(At) stand in Lemon Creek submesic ICH dw1 104
South Selkirk fire management stocking standards November 2018*

Fire management even-aged stocking standards

Intent and Guidance

These fire management even-aged stocking standards are designed to be applied in areas that have $<12 \text{ m}^2/\text{ha}$ of basal area of acceptable trees and thus cannot meet the partial cut/ shaded fuel break standard². These areas thus incur a regeneration obligation. To address fire management objectives, the even-aged standards promote lower conifer stocking, include deciduous species, and indicate a preference for fire resistant species and consider climate change. The primary focus for treatment in each of the BEC units listed here should be on drier than mesic sites (102, 103, 104). Standards are provided for 101 and 110 site series as a means of providing ecologically suitable species for these sites when they occur within broader fire treatment areas. The intent is that these site series are not targeted for fuel treatments since in many cases, it will be difficult and costly to prevent regeneration of trees (conifer and broadleaf species) and challenging to meet maximum conifer densities.

Deciduous species have been added to acceptable in these proposed standards. Although deciduous species may often be preferred from a strict fire management perspective, only conifers have been listed here as legally preferred in order to ensure a minimum conifer stocking in all stands. The minimum conifer standard is in place to address forest health and longevity issues associated with deciduous species in our District and to address (modest) timber objectives. Due to the much lower target stocking for these standards, an M-value limits of 4 is proposed for these standards³. Some clumpiness is thus permitted, especially considering that deciduous trees are acceptable this standard.

Cedar and hemlock have been demoted in these standards in recognition of the higher fuel hazards and lower fire resilience associated with these species. While they are still listed as acceptable on mesic and moist sites, more fire resistant species such as Py, Fd, and Lw are clearly preferred over Cw and Hw.

The even-aged fire management stocking standards presented below have been developed for the most common BEC subzones and site series found at low- to mid-elevations in the South Selkirks. A similar approach could be applied in other subzones and site series.

Rationale:

Broadleaf species are included as they are generally less flammable than other coniferous species and as a result may reduce fire behaviour. TSS/MSS have all been lowered by 33-67% the various sites series from non-WUI District standards to reduce future fuel amounts by less trees and ideally wider spaced trees. MITD minimum has been set to 2.0 metres as this should be readily achievable with the much lower stocking and assist with increasing distance between well spaced crop trees and future fire spread. Ideally spacing should be targeted to a higher inter tree distance based on the target planting density if implementing artificial regeneration.

Approach used to modify current default District stocking standards to WUI stocking standards

1. **Start** with designated preferred and acceptable species in the DSE South Columbia Default Stocking Standards (April 2018)—all based on new BEC in LMH 70
2. **Demote** CW, HW, and SX on all site series listed
3. **Promote** PY from acceptable to preferred in the ICHxw-101, ICHdw1-101 and ICHmw2 & ICH mw4-103 and -104 (PY is already preferred in ICHdw1-103 and -104)

² The partial cut (shaded fuel break) fire management standard should be preferentially used wherever pre-harvest stands have $\geq 12 \text{ m}^2/\text{ha}$ of acceptable leave trees.

³ A low M-value could make achievement of these standards impracticable. MITD limits still apply however.

4. **Add** AT and EP to acceptable on site series where ecologically suitable. Add ACT to acceptable on -110 site series. Broadleaf species are included as they are generally less flammable than other coniferous species and as a result may reduce fire behaviour.
5. **Reduce target and minimum stocking** from 1200/ 700/ 600, 1000/ 500/ 400 and 600/ 400/ 400 to 400/ 250/ 200 sph
6. **Add new requirement** for maximum 800 sph coniferous stocking at FG (i.e., may require conifer spacing prior to FG declaration)
7. **Revise countable conifer methodology** to require counting all conifers >50cm for purposes of assessment of maximum conifer stocking.

Fire management even-aged stocking standards													
SSID #	BGC	Site Series	Preferred species	Acceptable Species	Target WS/ha	MIN pa	MIN p	MAX conifer at FG	M-value	Regen Delay	FG early	FG late	FG Min tree height (m)
1062310	ICHdw1	101	Fd ⁵⁸ Lw Py Pw ³¹	Pl Cw Bg At Ep	400	250	200	800	4	7	12	20	Lw,Pl,At,Ep=2.0 Fd,Pw=1.4 Others=1.0
1062311		102	Fd Py	Lw Pl	400	250	200	800	4	7	12	20	Lw,Pl =1.4 Fd=1.0 Others=0.8
1062312		103	Fd ⁵⁸ Lw Py	Pl Pw ³¹	400	250	200	800	4	7	12	20	Lw,Pl=1.4 Fd,Pw=1.0 Others=0.8
1062313		104	Fd ⁵⁸ Lw Py Pw ³¹	Pl Bg At Ep	400	250	200	800	4	7	12	20	Lw,Pl,At,Ep=2.0 Fd,Pw=1.4 Others=1.0
1062314		110	Fd ^{1,58} Lw ^{1,201} Pw ³¹	Cw Hw Bg At Act Ep	400	250	200	800	4	7	12	20	Lw,Act,At,Ep=2.0 Fd,Pw=1.4 Others=1.0
1062315	ICHdm	101	Fd ⁵⁸ Lw Pw ³¹	Pl Bg ¹⁴ Cw At Ep	400	250	200	800	4	7	12	20	Lw,Pl,At,Ep=2.0 Fd,Pw=1.4 Others=1.0
1062316		102	Fd ⁵⁸ Lw Py	Pl At	400	250	200	800	4	7	12	20	Lw,Pl,At=2.0 Fd,Pw=1.4

1062317			103	Fd ⁵⁸ Lw Py Pw ³¹	PI Bg ¹⁴ At Ep	400	250	200	800	4	7	12	20	Lw, PI, At, Ep=2.0 Fd, Pw=1.4 Others=1.0
1062318			110	Fd ^{1,58} Lw ^{1,32,201} Pw ³¹	Cw Bg ¹⁴ Sx At Act Ep	400	250	200	800	4	7	12	20	Lw, At, Act, Ep=2.0 Fd, Pw=1.4 Others=1.0
1062319	ICHmw2	101		Fd ⁵⁸ Lw Pw ³¹	Bg ¹⁴ Cw At Ep	400	250	200	800	4	7	12	20	Lw, At, Ep=2.0 Fd, Pw=1.4 Others=1.0
1062320		102		Fd Py ^{14,203}	PI Lw	400	250	200	800	4	7	12	20	Lw, PI=2.0 Fd=1.4 Others=1.0
1062321		103		Fd Lw Py ^{14,203}	PI Pw ³¹ At	400	250	200	800	4	7	12	20	Lw, PI, At=2.0 Fd, Pw=1.4 Others=1.0
1062322		104		Fd ⁵⁸ Lw Pw ³¹ Py ¹⁴	PI Bg Cw At Ep	400	250	200	800	4	7	12	20	Lw, PI, At, Ep=2.0 Fd, Pw=1.4 Others=1.0
1062323		110		Fd ^{1,58} Lw ^{1,201} Pw ³¹	Cw Hw Sx At Act Ep	400	250	200	800	4	7	12	20	Lw, Act, At, Ep=2.0 Fd, Pw=1.4 Others=1.0
1062324	ICHmw4	101		Fd ⁵⁸ Lw Pw ³¹	Bg Cw At Ep	400	250	200	800	4	7	12	20	Lw, PI, At, Ep=2.0 Fd, Pw=1.4 Others=1.0

1062325		102	Fd ^{14,203} Py	PI Lw	400	250	200	800	4	7	12	20	Lw,Pl=1.4 Fd,Pw=1.0 Others=0.8
1062326		103	Fd Lw Py ¹⁴	PI Pw ³¹ At	400	250	200	800	4	7	12	20	Lw,Pl,At=2.0 Fd,Pw=1.4 Others=1.0
1062327		104	Fd ⁵⁸ Lw Pw ³¹ Py ¹⁴	PI Bg Cw At Ep	400	250	200	800	4	7	12	20	Lw,Pl,At,Ep=2.0 Fd,Pw=1.4 Others=1.0
1062328		110	Fd ^{1,58} Lw ^{1,201} Pw ³¹	Cw Hw Bg ¹⁴ At Act Ep	400	250	200	800	4	7	12	20	Lw,Pl,At,Ep,Act=2.0 Fd,Pw=1.4 Others=1.0
1062329	ICHxw&x wa	101	Fd ⁵⁸ Lw Py ^{9,203}	Bg Pw ³¹ At Ep	400	250	200	800	4	7			Lw,Pl,At,Ep=2.0 Fd,Pw=1.4 Others=1.0
1062330		102	Fd Py		400	250	250	800	4	7			Fd=1.0 Others=0.8
1062331		103	Fd Py	Lw At Ep	400	250	200	800	4	7			Lw,Pl,At,Ep=2.0 Fd,Pw=1.0 Others=0.8
1062332		104	Fd Lw Py ²⁰³	Bg PI Pw ³¹ At Ep	400	250	200	800	4	7			Lw,Pl,At,Ep=2.0 Fd,Pw=1.4 Others=1.0
1062332		110	Fd ^{1,58} Lw	Cw ²⁰⁴ Bg At, Ep	400	250	200	800	4				Lw,Pl,At,Ep,Act=2

Footnote #	<u>Footnote</u>
1	suitable on elevated microsites
9	suitable on warm aspects
14	suitable at lower elevations
31	must use of blister rust resistant stock. See BC Journal of Ecosystems and Management 10(1): 97-100 for supplementary information.
58	South Area - Fd limited to a max 50% of preferred and acceptable well-spaced stems in the IDFmw and all subzones of the ICH due to root rot. See Root Rot Handbook (2017, in press)
	Maximum 50% of preferred and acceptable well-spaced trees
201	
203	Recommended on sites for climate change adaptation
204	Not recommended due to climate change concerns