

Integrated Stewardship Strategy for the Cranbrook TSA

Tactical Plan

Version 1.1

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Project 419-38

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Executive Summary

The tactical plan document is the fifth in a series of documents developed through the Integrated Stewardship Strategy (ISS) for the Cranbrook TSA initiated by the British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development. The Tactical Plan integrates three plans generated by the Combined Scenario analysis for the Cranbrook ISS: reserve, harvest, and silviculture plans. Ultimately, it provides operational direction and bridges strategic, forest-level analyses, and operational planning processes.

This document describes the approach used to develop the tactical plan and summarizes the key results for the first 20 years of the planning horizon – 2 ten-year periods. In addition to this document, spatial datasets were prepared for scheduled and eligible activities, along with detailed statistics in an accompanying MS Excel file that includes detailed statistics of the key indicators that can be monitored over time.

These results are intended to guide planners towards stands where more detailed fieldwork can be done to assess potential treatment opportunities. Documenting the assumed operational criteria now and tracking how these are implemented over the next few years will assist in improving future modelling exercises that explore strategies to improve timber and non-timber values throughout the Cranbrook TSA.

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Document Revision History

Version	Date	Notes/Revisions
0.1	October 6, 2019	First version of the document distributed to project team for review and comment.
1.0	October 22, 2019	Adjusted harvest system summaries.
1.1	November 25, 2019	Included notes regarding cable harvest systems profile (section 4).

1 Introduction

The British Columbia Ministry of Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD) initiated an Integrated Stewardship Strategy (ISS) – sustainable forest management analysis – in the Cranbrook Timber Supply Area (TSA). This document is the fifth in a series of seven documents prepared through the ISS process and describes the tactical plan developed over the first 20 years of the planning horizon. The Tactical Plan integrates three plans generated by the Combined Scenario analysis for the Cranbrook ISS: reserve, harvest, and silviculture plans. Ultimately, it provides operational direction and bridges strategic, forest-level analyses, and operational planning processes. In addition to this document, spatial datasets were prepared for scheduled and eligible activities, along with detailed statistics in an accompanying MS Excel file that includes detailed statistics of the key indicators that can be monitored over time.

2 Data Gathering and Preparations

Data used for this project were derived from modelling outputs of the Combined Scenario analysis. Detailed descriptions of the modelling approaches, assumptions, and results are available from separate ISS documents: the Data Package¹ and the Analysis Report². Results were queried and linked to generate spatial data for the first 2 periods of the planning horizon (i.e., total of 20 years grouped into two 10-year periods; labelled in all tables as the last year of each period). These results included treatment availability, as well as, the full extent of treatment areas scheduled. In most cases, the spatial datasets were summarized according to 43 landscape units (Figure 1), while scheduled blocks can be further analyzed on additional operational criteria (e.g., potential benefits to non-timber values, the amount of remaining green volume, site productivity, distance from communities, access difficulties, and proximity to appropriate seed sources). Detailed statistics were also provided in a separate MS Excel workbook.

¹ Forsite 2019. Integrated Stewardship Strategy for the Cranbrook TSA – Data Package. Version 1.0. September 2019. Prepared for the BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development.

² Forsite 2019. Integrated Stewardship Strategy for the Cranbrook TSA – Analysis Report. Version 1.0. September 2019. Prepared for the BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development.

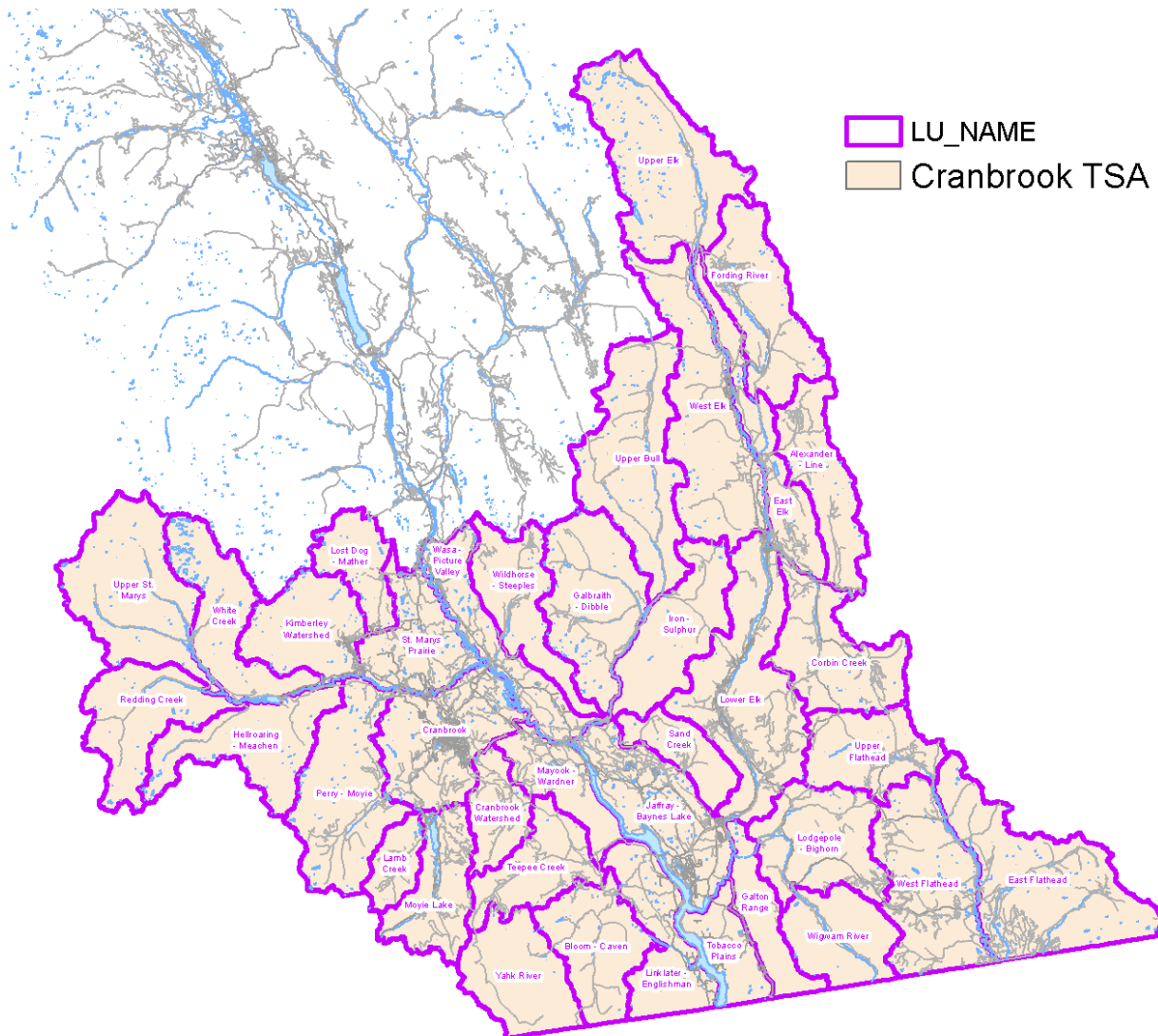


Figure 1 Landscape Units within the Cranbrook TSA

3 Reserve Plan

The Reserve Plan spatially identified where and how we should reserve forested stands to address landscape-level biodiversity and where possible, non-timber values, while minimizing impacts to the working forest. In the Combined Scenario and this Tactical Plan, we locked these reserves from being harvested over the first 20 years of the planning period. Since seral stage for some stands may change over the 20-year tactical plan period, the Reserve Plan reports areas associated with current (2019) seral stage classification (Table 1 and Appendix 1). Spatial reserves were included in the accompanying GIS layers for this Tactical Plan.

Table 1 Reserved Areas by NDT/BEC Variant, Seral Stage, and Landbase Type

Natural Disturbance Type	BEC Variant	NHLB				Total
		Old	Mature	Mid	Early	
NDT1	ESSFwm 2	3,352	2,544	356	637	6,889
	ESSFwmw	3,896	3,959	205	228	8,288
NDT2	ESSFwh 2	921	367	159	80	1,527
	ESSFwm 1	1,661	1,474	347	20	3,502
	ESSFwm 4	928	4,065	761	182	5,936
	ICH mw 2	292	9	2		302
NDT3	ESSFdk 1	24,118	1,245	4,308	258	29,929
	ESSFdk 2	9,281	1,041	3,268	85	13,675
	ESSFdkw	8,800	218	362	7	9,387
	ICH dm	7,851	950	1,284	264	10,349
	ICH dw 1	348	39	16	1	404
	ICH mk 4	2,579	1,038	2,742	134	6,493
	MS dk	1,375	538	2,503	177	4,593
	MS dw	14,715	3,533	7,171	711	26,130
NDT4	IDF dm 2	76	7,751	2,963	312	11,103
	IDF xx 2	7	2,124	379	120	2,630
NDT5	ESSFdkp	494				494
	ESSFwmp	791				791
	IMA un	9				9
Totals		81,495	30,894	26,826	3,217	142,432

These figures are further summarized by LU in Appendix 1.

4 Harvest Plan

The Harvest Plan aimed to prioritize stands for harvest over the short-term that align with mid- and long-term strategy developed in this ISS project. While no harvest partitions were formally implemented to influence harvest performance, this Harvest Plan incorporated harvest profiles for harvest system and haul time, as well as, opening size criteria to reduce the amount of small (<5 ha) openings.

The Harvest Plan includes the following indicators:

- Harvested area by harvest system (Table 2). Harvest systems were assigned according to slope classification (Ground <40%; Cable 40 to 70%), and wildfire management tactic (stands in the NDT4 designated for Fire Maintained Ecosystem Restoration (FMER) as Open Forest and Open Range).

Note that we based the Cable Harvest Systems profile on the THLB defined in TSR4, which was reduced by half in the AAC determination. These percentages should be increased to demonstrate performance for a potential AAC increase in future TSRs.

- Harvested area by one-way haul time (Table 4). Haul times were calculated using the consolidated road network. These roads were segmented and a travel time was calculated for each segment from the closest (by time) mill location, based on an average haul speed assigned to the road classification.
- Percentage of harvested area by species group (Table 6). Stands were classified into the following four tree species groups based on their individual tree species volumes: SxPl, PyCw, HwBl, and FdLw.

We summarized harvested areas by Landscape Unit (Figure 1) in Appendix 2, and in a separate MS Excel workbook. Spatial layers for the Harvest Plan were also included in the accompanying GIS layers for this Tactical Plan.

Table 2 Harvested Area (ha) by Harvest System and 10-Year Planning Period

Harvest System	Years 1-10		Years 11-20		Total
	Ground	Cable	Ground	Cable	
Clearcut	30,579	4,308	29,831	4,121	68,839
Partial Cut – Open Forest	2,977	22	7,372	102	10,472
Clearcut – Open Range	2,732	2	88		2,821
Total	36,288	4,331	37,290	4,223	82,132

These figures are further summarized by LU in Appendix 2.

Table 3 Harvested Percentage by Harvest System and 10-Year Planning Period

Harvest System	Years 1-10		Years 11-20	
	Ground	Cable*	Ground	Cable*
Clearcut	75%	11%	72%	10%
Partial Cut – Open Forest	7%	0%	18%	0%
Clearcut – Open Range	7%	0%	0%	0%
Total	89%	11%	90%	10%

* Note that we based the Cable Harvest Systems profile on the THLB defined in TSR4, which was reduced by half in the AAC determination. These percentages should be increased to demonstrate performance for a potential AAC increase in future TSRs.

Table 4 Harvested Area (ha) by One-Way Haul Time and 10-Year Planning Period

Haul Time	Years 1-10	Years 11-20	Total
< 0.5 hrs	22,566	23,455	46,021
0.5 to 1.0 hrs	13,261	13,329	26,590
1.0 to 1.5 hrs	3,911	4,545	8,456
>1.5 hrs	881	183	1,064
Total	40,619	41,513	82,132

These figures are further summarized by LU in Appendix 2.

Note: Average one-way haul time from nearest processing facility.

Table 5 Harvested Percentage by One-Way Haul Time and 10-Year Planning Period

Haul Time	Years 1-10	Years 11-20
< 0.5 hrs	56%	57%
0.5 to 1.0 hrs	33%	32%
1.0 to 1.5 hrs	10%	11%
>1.5 hrs	2%	0%
Total	100%	100%

Note: Average one-way haul time from nearest processing facility.

Table 6 Percentage of Harvested Volume by Species Group and 10-Year Planning Period

Species Group	Years 1-10	Years 11-20
FdLw	32%	32%
HwBl	8%	5%
PyCw	3%	2%
SxPl	57%	61%
Total	100%	100%

These figures are further summarized by LU in Appendix 2.

5 Silviculture Plan

The Silviculture Plan to enhance timber quantity and quality over the mid- and long-term, as well as, improve biodiversity, wildlife habitat, and cultural interests. Three tactics were included: enhanced basic silviculture (ENH), commercial thinning (CT), and fertilization (FERT). To develop the Silviculture Plan, we implemented ENH and FERT treatments over the first 20 years but extended CT to 60 years and limited the area treated for ENH and CT and annual budget for CT and FERT according to Table 7.

Table 7 Unit costs and limits applied for silviculture tactics

Treatment	Unit Cost	Limits
Enhanced Basic Silviculture	\$385/ha	10% of the eligible area over each period
Commercial Thinning	50% of \$1,200/ha	5% of the eligible area over each period and within annual budget of \$300,000.
Fertilization (1 or 2 treatments)	\$450/ha each application	Within annual budget of \$300,000.

The Silviculture Plan includes the following indicators:

- Annual area treated and budget spent to support silviculture investments.
- Area treated by LU and BEC variant for each silvicultural tactic: ENH, CT, and FERT.

We summarized the treated areas by Landscape Unit (Figure 1) in Appendix 3, and in a separate MS Excel workbook. Spatial layers for the Silviculture Plan were also included in the accompanying GIS layers for this Tactical Plan.

The subsections below briefly describe elements considered for modelling and subsequent mapping of treatment opportunities and priorities for each of the three tactics modelled.

5.1 Enhanced Basic Silviculture

Enhanced basic silviculture activities are most attractive on stands where we expect incremental volumes will contribute – directly or indirectly – to the harvest when the merchantable growing stock is lowest (i.e., in 50 to 70 years). The Combined Scenario showed that this tactic contributes significantly to the harvest rates at the end of the mid-term (decades 7 and 8), as well as, the start of the long-term (decades 9 and 10), allowing other stands to be harvested in the mid-term. In addition to the timber supply benefits, we expect the higher density stands developed through these treatments to improve timber quality through lower knot size, reduced risk of damage from agents and climate change, and increased opportunities for future stand management.

Objective

Key objectives of enhanced silviculture activities include faster growth and increased volume from planting stands with improved seed at higher densities.

Eligibility, Costs, and Responses

Table 8 describes the criteria applied to identify and prioritize eligible stands, apply costs, and implement responses.

Table 8 Enhanced Silviculture Eligibility, Costs, and Responses

Element	Description	Criteria
Eligible Stands	Existing natural and managed stands (approx. 131,538 ha THLB – 22,498 ha productive, 76,833 ha health risk, and 32,207 ha productive/health risk).	<ul style="list-style-type: none"> Productive stands: all stands (except CH-, OT- leading) outside FMER and SI managed ≥ 18 m Health risk stands (if not included above) and SI managed ≥ 15 m <ul style="list-style-type: none"> Root-rot: non-ESSF and Fd- and PI-leading Rust: PI-leading within spatially identified pine rust risk area (MSdk 101 and 105; MSdw 101 and 104)
Timing	As stands that are harvested/regenerated in the model	First 20 years of the planning horizon
Treatment Response	Regeneration method	
	Density	Increase planting to 1,700 stems/ha
	Species Composition	No changes from the Base Case
	Genetic gains	No changes from the Base Case
	Regeneration delay	From 2 yrs to 1 yr
Costs	Incremental planting of trees sown with select seed	\$385/ha

Challenges

While there is currently no direct funding allocated for the enhanced basic silviculture activities, other regions have developed processes to utilize operational cost allowances through the stumpage appraisal system. Implementing a similar approach here may take up to 5 years to develop.

5.2 Commercial Thinning

Commercial thinning activities aim to make more merchantable volume available in the mid-term by developing bigger stems and thereby lowering MHA. This is accomplished by managing light available to crop trees to shift growth onto fewer stems and species selection/management. In some instances, commercial thinning can improve wildlife habitat and mitigate the risk of wildfire.

Objectives

Key objectives of commercial thinning are to reduce minimum harvest age of stands harvested over the next 60 years by increasing piece size of crop trees while recovering volume from the thinning process. Lower merchantable volume at rotation is considered acceptable under this tactic for increasing harvest rates over the mid-term.

Eligibility, Costs, and Responses

Table 9 describes the criteria applied to identify and prioritize eligible stands, apply costs, and implement responses.

Table 9 Commercial Thinning Eligibility, Costs, and Responses

Element	Description	Criteria
Eligible Stands	Existing natural and managed stands (Approx. 3,629 ha THLB)	<ul style="list-style-type: none"> Leading Species: Fd, Lw, Sx Age: 20yrs before and 10 years after age of treatment BEC: all SI (managed or natural): ≥ 18 m Slope: $\leq 40\%$ Haul Time: 1.5 hr one-way FMER: outside FMER only
Timing	Yield/Age criteria	Age of treatment: at minimum 100 m ³ /ha

		<ul style="list-style-type: none"> ○ Intensity: 40% of standing volume ○ Time window: maximum 10 yrs ○ Lock for 20 yrs following treatment
Treatment Response	Yield increase following commercial thinning	○ Treatment response developed for each yield in TASS. The response factor applied then to the corresponding yield developed in VDYP/TIPSY to be aligned with the Base Case.
	Transition of thinned stand	○ Final harvest MHA: 20yrs after commercial thinning (or same as un-thinned MHA). If combined with fertilization application, stand is locked from harvest for 10 yrs after each fertilization application.
Costs	Net cost (cost of treatment less revenue from sales of thinned wood)	<ul style="list-style-type: none"> ○ Total Cost: \$1,200/ha ○ Net Cost: 50% of Total Cost = \$600/ha

Challenges

Operational plans for commercial thinning treatments should carefully consider potential issues related to harvest systems, season and local markets. Planners must also understand trade-offs between damage to remaining trees and the redistributed volume growth.

5.3 Fertilization

Fertilization directly increases volume of crop trees after several years. Despite the limited number of stands currently available to treat, fertilization treatments play an important role in the overall strategy. The Combined Scenario analysis showed that fertilized stands contribute to the harvest flow in the mid-term (i.e., second to fourth decades).

Objectives

Key objectives of fertilization activities include accelerating the rate of stand development, and increasing merchantable yield and value of stands harvested within the mid-term.

Eligibility, Costs, and Responses

Table 10 describes the criteria applied to identify and prioritize eligible stands, apply costs, and implement responses. Within this 20-year tactical plan, eligible stands can undergo one or two consecutive applications 7 years apart. To maximize return on investment, harvesting fertilized stands we avoided for 7 years following application.

Table 10 Fertilization Eligibility, Costs, and Responses

Element	Description	Criteria								
Eligible Stands	Young natural and existing managed stands (approx. 23,663 ha THLB – 5,859 ha for 1 application only, 17,804 ha for 1-2 applications)	<ul style="list-style-type: none">o $Fd + Lw + Sx + PI \geq 80\%$; Sx-leading $\geq 70\%$o BEC: MS, ICH, and ESSF below 1,650 mo FMER: outside FMER onlyo SI managed: >15o Slope $\leq 40\%$								
Timing	Minimum and maximum age defining opportunity window, for up to 2 applications, every 7 years	7 years before MHA for 1 application, 14 years before MHA for 2 applications								
Treatment Response	Growth increase 7 years after application (entire stand) – existing natural stands	10 m ³ /ha for each application.								
	Growth increase after application (entire stand) – existing managed stands	<table><tr><th>Applications (every 7 yrs)</th><th>Fd/Lw (m³/ha)</th><th>PI (m³/ha)</th><th>Sx (m³/ha)</th></tr><tr><td>1</td><td>15</td><td>12</td><td>16</td></tr></table>	Applications (every 7 yrs)	Fd/Lw (m ³ /ha)	PI (m ³ /ha)	Sx (m ³ /ha)	1	15	12	16
Applications (every 7 yrs)	Fd/Lw (m ³ /ha)	PI (m ³ /ha)	Sx (m ³ /ha)							
1	15	12	16							

		2	30	24	32
	Transitions to future stands	Locked from harvesting, 10 years after last application.			
Costs	Fertilization costs for all stands	\$450/ha for each application.			

Challenges

Operational plans for fertilization treatments should carefully consider potential issues related to non-timber values such as fish and water quality where riparian buffers are required to prevent fertilizer from entering streams and lakes. Additional buffers from other features and other measures may be required to address First Nations' concerns with applying fertilizer to stands within their traditional territories.

5.4 Results

The silviculture plan results are summarized in Table 11, shown in Figure 2, and detailed in Appendix 3

Table 11 Treated Area (ha) by Silvicultural Tactic and 10-Year Planning Period

Treatment	Years 1-10	Years 11-20	Years 21-60	Total
Enhanced Basic Silviculture	4,330	4,262		8,592
Commercial Thinning	13	8	136	157
Commercial Thinning + Fertilization (single treatment)		7		7
Fertilization (single treatment)	1,397	97		1,494
Fertilization (two treatments)	1,168	1,004		2,172
Total	6,908	5,378	282	12,422

These figures are further summarized by LU in Appendix 3.

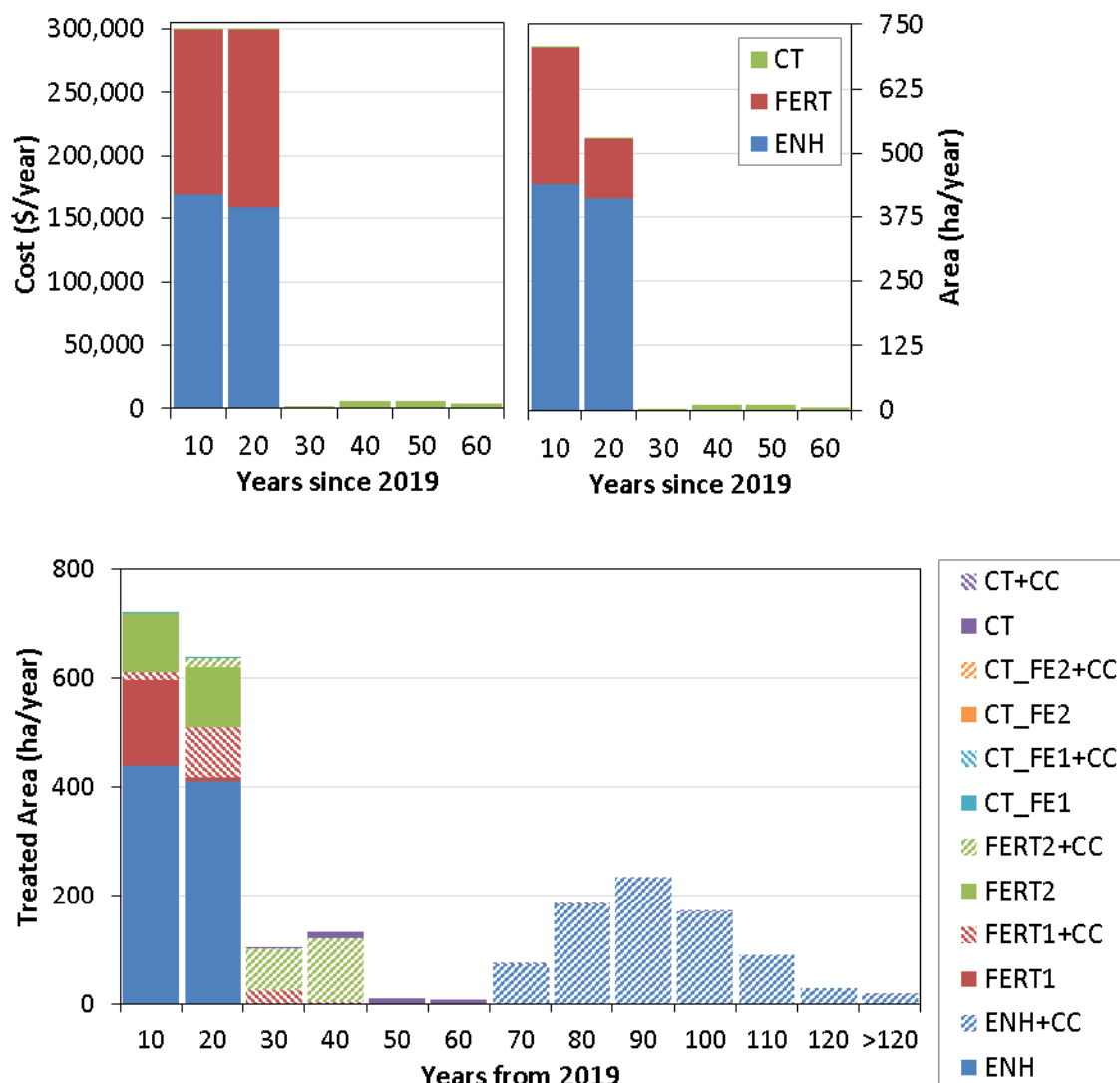


Figure 2 Silviculture Plan – Treated Area and Budget Spent

6 Discussion

This tactical plan provides guidance to forest professionals developing operational plans by identifying specific stands scheduled for potential treatment opportunities. It was developed using modelling outputs from the ISS Combined Scenario. It must be stressed that the spatial data used to develop this tactical plan were typically forest-level inventories so direct applications for operational and stand-level planning are limited. These data are appropriate for guiding planners to areas where more detailed fieldwork is required to assess actual treatment opportunities. Moreover, this tactical plan provides guidance towards achieving the future forest condition presented in the Combined Scenario.

The exercise of incorporating operational criteria into the tactical plan could highlight new constraints to include with future stewardship strategies. Ideally, documenting the assumed operational criteria now and tracking results on how these are implemented over the next few years will assist in improving future modelling exercises that explore strategies to improve timber and non-timber values throughout the Cranbrook TSA.

In addition to this document, this tactical plan includes spatial datasets prepared for scheduled and eligible activities, along with detailed statistics in a separate MS Excel workbook.

Appendix 1 Reserve Plan

Reserved Area (ha) by LU and Seral Stage

Landscape Unit	FMLB (ha)	NHLB			
		Old	Mature	Mid	Early
Alexander - Line	1,735	1,526	73	133	3
Blackfoot/Thunder	11	7			4
Bloom - Caven	4,524	3,011	642	787	83
Buhl/Bradford	5		1		4
Corbin Creek	488	389	59	40	
Cranbrook	2,966	1,141	251	1,522	52
Cranbrook Watershed	2,356	1,700	417	214	25
East Elk	163	124	18	14	7
East Flathead	8,784	5,974	1,069	1,541	200
Fording River	2,045	1,719	138	115	74
Galbraith - Dibble	3,665	1,400	1,342	899	24
Galton Range	2,131	1,665	113	351	2
Hellroaring - Meachen	8,408	2,536	541	4,335	996
Iron - Sulphur	3,246	1,473	1,052	718	3
Jaffray - Baynes Lake	2,624		1,321	1,146	158
Kimberley Watershed	3,061	2,047	156	846	11
Lamb Creek	1,339	633	157	445	104
Linklater - Englishman	3,636	945	631	1,874	186
Lodgepole - Bighorn	5,277	3,434	1,088	487	268
Lost Dog - Mather	2,335	790	1,101	376	68
Lower Elk	3,063	1,161	742	1,142	18
Mayook - Wardner	1,975	1,033	192	746	4
Moyie Lake	3,129	1,400	711	973	45
Perry - Moyie	7,892	4,374	701	2,716	101
Redding Creek	4,858	3,889	187	763	19
Sand Creek	1,564	1,291	46	224	3
St. Marys Prairie	1,209		418	711	80
Teepee Creek	3,664	2,295	490	755	124
Tobacco Plains	882		207	672	3
Upper Bull	4,469	3,256	889	245	80
Upper Elk	9,707	4,647	4,389	566	106
Upper Flathead	2,124	1,856	216	19	33
Upper St. Marys	4,672	3,487	313	855	16
Wasa - Picture Valley	1,561	25	135	1,384	17
West Elk	8,936	7,139	758	1,031	9
West Flathead	5,269	3,901	1,168	143	57
White Creek	3,051	1,791	72	1,185	3
Wigwam River	7,832	3,871	3,825	108	27
Wildhorse - Steeples	3,219	2,771	37	410	
Yahk River	4,552	2,787	1,159	405	200
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Totals	142,432	81,495	26,826	30,894	3,217

Appendix 2 Harvest Plan

Harvested Area (ha) by Landscape Unit, Harvest System, and 10-Year Planning Period

Operating Area	Years 1-10						Years 11-20					
	Ground			Cable			Ground			Cable		
	CC	PC-OF	CC-OR	CC	PC-OF	CC-OR	CC	PC-OF	CC-OR	CC	PC-OF	CC-OR
Alexander - Line	456			64			498			20		
Blackfoot/Thunder												
Bloom - Caven	3,007	89	39	405	5		2,036	57	26	369	7	
Buhl/Bradford												
Corbin Creek	179			11			197			6		
Cranbrook	2,126	415	252	39			1,752	1,061		51	4	
Cranbrook Watershed	1,884	3		130			1,655	4		122		
East Elk	5						61					
East Flathead	1,901	1		102			1,672			25		
Fording River	242			24			72			9		
Galbraith - Dibble	645			170			964			270		
Galton Range	296	174	6	214	8		299	120		185	41	
Hellroaring - Meachen	347			222			289			333		
Iron - Sulphur	670			215			405			216		
Jaffray - Baynes Lake	949	646	845	12	3		1,204	833	37	28	9	
Kimberley Watershed	1,743			280			1,235	5		196	2	
Lamb Creek	84						162			15		
Linklater - Englishman	1,434	400	320	211			1,530	1,640	2	175	20	
Lodgepole - Bighorn	197			76			240			16		
Lost Dog - Mather	726	29		31			1,202	45		38		
Lower Elk	55			16			146			37		
Mayook - Wardner	1,267	105	35	68			1,008	252	17	68	4	
Moyie Lake	907	2		105			1,723	4		156		
Perry - Moyie	2,087	23		152			2,114	36		206	2	
Redding Creek	480			178			298			317		
Sand Creek	290	8		133			150			102		
St. Marys Prairie	89	239	245				149	754				
Teepee Creek	3,035	2		314			1,428	83		99	5	
Tobacco Plains	35	44	282	1	6			1,161	0		6	
Upper Bull	339			126			1,160			293		
Upper Elk	346			8			226			5		
Upper Flathead	324			12			784			9		
Upper St. Marys	182			212			166			110		
Wasa - Picture Valley	330	795	693	7			125	1,304	7	4		
West Elk	500			50			707			72		
West Flathead	1,046			36			1,449			16		
White Creek	285			100			373			90		
Wigwam River	183			41			268			139		
Wildhorse - Steeples	389		15	373		2	195	14		168	3	
Yahk River	1,522			171			1,890			154		
Totals	30,579	2,977	2,732	4,308	22	2	29,831	7,372	88	4,121	102	

PC-OF = Partial Cut, Open Forest; CC-OR = Clearcut, Open Range

Harvested Area by Landscape Unit, One-Way Haul Time (hours), and 10-Year Planning Period

Landscape Unit	Years 1-10				Years 11-20			
	< 0.5	0.5-1.0	1.0-1.5	>1.5	< 0.5	0.5-1.0	1.0-1.5	>1.5
Alexander - Line	334	186			336	182		
Blackfoot/Thunder								
Bloom - Caven	3,522	24			2,465	29		
Buhl/Bradford								
Corbin Creek	6	184				203		
Cranbrook	2,831				2,868			
Cranbrook Watershed	1,194	823			955	826		
East Elk		5				61		
East Flathead		76	1,181	748		206	1,401	90
Fording River		190	76			53	28	
Galbraith - Dibble	2	573	240		1	636	557	40
Galton Range	660	38			620	24		
Hellroaring - Meachen	122	448			44	578		
Iron - Sulphur	42	820	23		26	510	85	
Jaffray - Baynes Lake	2,454				2,112			
Kimberley Watershed	340	1,683			310	1,128		
Lamb Creek	74	10			118	59		
Linklater - Englishman	1,172	1,191		1	2,291	1,074		
Lodgepole - Bighorn	37	235			161	94		
Lost Dog - Mather	327	459			610	675		
Lower Elk	67	4			180	4		
Mayook - Wardner	1,185	290			1,095	253		
Moyie Lake	858	156			1,543	340		
Perry - Moyie	1,823	439			1,942	417		
Redding Creek		242	374	43		241	362	12
Sand Creek	431				252			
St. Marys Prairie	534	39			903			
Teepee Creek	1,807	1,546			824	791		
Tobacco Plains	368				1,167			
Upper Bull		219	246			1,156	298	
Upper Elk		23	324	6		58	173	
Upper Flathead		336				762	31	
Upper St. Marys		23	371			67	210	
Wasa - Picture Valley	1,663	162			1,397	42		
West Elk	259	290			386	394		
West Flathead		193	876	12		367	1,096	2
White Creek	99	119	166		136	97	230	
Wigwam River		203	21			386	19	1
Wildhorse - Steeples	148	631			142	238		
Yahk River	207	1,402	13	71	572	1,378	56	39
Totals	22,566	13,261	3,911	881	23,455	13,329	4,545	183

PC-OF = Partial Cut, Open Forest; CC-OR = Clearcut, Open Range

Harvested Percent by Landscape Unit, Species Group, and 10-Year Planning Period

Landscape Unit	Years 1-10				Years 11-20			
	FdLw	HwBI	PyCw	SxPI	FdLw	HwBI	PyCw	SxPI
Alexander - Line	0.1%	0.5%	0.0%	0.8%	0.1%	0.3%	0.0%	0.9%
Blackfoot/Thunder	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Bloom - Caven	3.3%	0.4%	0.1%	4.3%	1.9%	0.2%	0.0%	3.6%
Buhl/Bradford	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Corbin Creek	0.0%	0.2%	0.0%	0.3%	0.0%	0.1%	0.0%	0.4%
Cranbrook	3.3%	0.3%	0.3%	2.2%	3.3%	0.1%	0.2%	1.9%
Cranbrook Watershed	0.8%	0.2%	0.0%	4.8%	0.7%	0.3%	0.0%	4.6%
East Elk	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
East Flathead	0.8%	0.5%	0.0%	3.8%	0.8%	0.1%	0.0%	3.4%
Fording River	0.1%	0.1%	0.0%	0.5%	0.0%	0.0%	0.0%	0.1%
Galbraith - Dibble	0.3%	0.7%	0.0%	1.3%	0.7%	0.5%	0.0%	2.4%
Galton Range	0.6%	0.2%	0.0%	0.8%	0.6%	0.1%	0.0%	0.6%
Helroaring - Meachen	0.5%	0.2%	0.0%	1.0%	0.5%	0.2%	0.0%	1.4%
Iron - Sulphur	0.4%	0.3%	0.0%	1.9%	0.4%	0.1%	0.0%	1.2%
Jaffray - Baynes Lake	2.2%	0.0%	0.6%	1.2%	2.1%	0.0%	0.2%	1.5%
Kimberley Watershed	1.2%	0.6%	0.0%	4.6%	0.9%	0.2%	0.0%	3.2%
Lamb Creek	0.0%	0.0%	0.0%	0.2%	0.1%	0.1%	0.0%	0.3%
Linklater - Englishman	2.7%	0.1%	0.3%	1.5%	3.3%	0.1%	0.3%	1.8%
Lodgepole - Bighorn	0.1%	0.2%	0.0%	0.5%	0.2%	0.0%	0.0%	0.5%
Lost Dog - Mather	0.6%	0.0%	0.0%	1.6%	1.2%	0.1%	0.0%	2.6%
Lower Elk	0.1%	0.0%	0.0%	0.1%	0.2%	0.0%	0.0%	0.3%
Mayook - Wardner	1.8%	0.1%	0.1%	1.7%	1.5%	0.1%	0.1%	1.5%
Moyie Lake	1.0%	0.1%	0.0%	1.5%	1.8%	0.3%	0.0%	3.2%
Perry - Moyie	1.9%	0.4%	0.0%	4.0%	1.4%	0.4%	0.0%	5.4%
Redding Creek	0.8%	0.1%	0.0%	0.8%	0.8%	0.1%	0.0%	0.9%
Sand Creek	0.3%	0.3%	0.1%	0.6%	0.2%	0.1%	0.1%	0.4%
St. Marys Prairie	0.4%	0.0%	0.2%	0.3%	0.7%	0.0%	0.1%	0.4%
Teepee Creek	2.3%	0.5%	0.0%	6.2%	1.0%	0.3%	0.0%	2.9%
Tobacco Plains	0.4%	0.0%	0.2%	0.0%	0.7%	0.0%	0.2%	0.1%
Upper Bull	0.1%	0.4%	0.0%	0.7%	0.7%	0.3%	0.0%	3.2%
Upper Elk	0.1%	0.0%	0.0%	0.7%	0.1%	0.0%	0.0%	0.5%
Upper Flathead	0.1%	0.2%	0.0%	0.7%	0.1%	0.1%	0.0%	1.7%
Upper St. Marys	0.3%	0.3%	0.1%	0.7%	0.3%	0.1%	0.0%	0.4%
Wasa - Picture Valley	1.9%	0.0%	0.6%	0.3%	1.2%	0.0%	0.3%	0.1%
West Elk	0.3%	0.2%	0.0%	1.2%	0.4%	0.2%	0.0%	1.8%
West Flathead	0.7%	0.3%	0.0%	1.5%	1.0%	0.1%	0.0%	2.5%
White Creek	0.4%	0.1%	0.0%	0.5%	0.8%	0.1%	0.0%	0.4%
Wigwam River	0.1%	0.0%	0.0%	0.5%	0.2%	0.0%	0.0%	0.9%
Wildhorse - Steeples	0.5%	0.7%	0.0%	1.0%	0.4%	0.2%	0.0%	0.4%
Yahk River	1.3%	0.3%	0.1%	3.0%	1.5%	0.3%	0.0%	3.6%
Totals	31.9%	8.5%	2.7%	57.0%	31.8%	5.3%	1.8%	61.1%

Appendix 3 Silviculture Plan

Treated Area by Landscape Unit, Treatment Type, and 10-Year Planning Period

Landscape Unit	ENH		CT		CT_FE1		FE1		FE2	
	Years 1-10	Years 11-20	Years 1-10	Years 11-20	Years 1-10	Years 11-20	Years 1-10	Years 11-20	Years 1-10	Years 11-20
Alexander - Line	4	14								
Blackfoot/Thunder										
Bloom - Caven	270	252					243		187	384
Buhl/Bradford										
Corbin Creek										
Cranbrook	153	213					88		57	2
Cranbrook Watershed	262	199					33		2	
East Elk	2	6								
East Flathead	75	34								
Fording River	7	5								
Galbraith - Dibble	73	134							39	5
Galton Range	81	65					2			
Hellroaring - Meachen	64	77					18		30	7
Iron - Sulphur	86	107							8	
Jaffray - Baynes Lake	426	437								
Kimberley Watershed	212	187					39	2	2	
Lamb Creek	7	2							103	4
Linklater - Englishman	178	174					61			
Lodgepole - Bighorn	58	57					10		11	1
Lost Dog - Mather	220	183								
Lower Elk	27	119		8			39			
Mayook - Wardner	284	148					17	19	35	
Moyie Lake	301	536					113		72	44
Perry - Moyie	295	150	13				234	36	129	62
Redding Creek	84	45								
Sand Creek	11	18					2		1	
St. Marys Prairie	39	25								
Teepee Creek	278	115					106	32	140	86
Tobacco Plains										
Upper Bull	33	205							5	3
Upper Elk	56	15								
Upper Flathead	4	3							25	16
Upper St. Marys	21	42							5	
Wasa - Picture Valley	12	18								
West Elk	136	129				7	13	8	63	83
West Flathead	57	27							25	7
White Creek	33	89					26		37	6
Wigwam River	108	142					9			
Wildhorse - Steeples	52	46								
Yahk River	321	243					345		193	293
Totals	4,330	4,262	13	8	7	7	1,397	97	1,168	1,004

Treated Area by BEC Variant, Treatment Type, and 10-Year Planning Period

BEC Variant	ENH		CT		CT_FE1		FE1		FE2	
	Years 1-10	Years 11-20	Years 1-10	Years 11-20	Years 1-10	Years 11-20	Years 1-10	Years 11-20	Years 1-10	Years 11-20
ESSFdk 1	185	262					60	36	51	17
ESSFdk 2	8	24								
ESSFwh 2		6								
ESSFwm 1	1	18								
ESSFwm 4	131	129					57		56	9
ICH dm	746	884					570	34	348	333
ICH dw 1	47	102					11			14
ICH mk 4	152	344		8			39		37	5
ICH mw 2		5								
IDF dm 2	806	880								
IDF xx 2	28	5								
MS dk	189	282					10	8	18	79
MS dw	2,036	1,322	13			7	651	19	658	548
Total	4,330	4,262	13	8		7	1,397	97	1,168	1,004