

Integrated Stewardship Strategy for the Merritt TSA

Tactical Plan

Version 1.1

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Project 419-36

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Executive Summary

The tactical plan document is the fifth in a series of seven documents developed through the Integrated Stewardship Strategy (ISS) for the Merritt 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 Merritt 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. 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.

Candidate reserves developed through the Reserve Scenario were examined in the Combined Scenario but represented a significant departure from the current approach to maintain landscape-level biodiversity. Consequently, the Reserve Plan did not utilize the candidate reserves; rather, the spatial OGMA's were summarized for this Tactical Plan.

Areas treated under this tactical plan are summarized in the following table.

Landscape Unit	Years 1 to 5					Years 6 to 10				
	Harvest	Rehab	Fertilized	Enhanced	WUI 600 sph	Harvest	Rehab	Fertilized	Enhanced	WUI 600 sph
Coldwater	1,194	49	366	385	346	2,025	64	246	927	480
Hayes	2,380	144	2,176	985	299	2,060	64	1,001	848	321
Lower Nicola	3,982	34	313	2,070	157	4,484	55	115	2,042	354
McNulty	1,301	-	408	704	21	1,368	2	287	693	64
Otter	1,920	25	958	904	342	2,130	40	863	925	550
Similkameen	4,866	239	1,146	1,879	635	5,194	153	1,264	2,489	471
Smith-Willis	2,990	207	1,253	1,247	221	2,124	56	885	804	227
Spus	3,480	133	1,241	2,239	184	2,719	83	1,062	1,781	152
Summers	1,491	181	763	602	529	1,281	264	753	646	488
Swakum	2,368	54	481	938	223	1,654	76	336	565	288
Tulameen	3,794	19	737	2,007	230	3,522	5	442	2,056	151
Upper Nicola	2,983	89	1,951	1,751	212	2,756	60	1,298	1,279	229
Total Area (ha)	32,749	1,175	11,792	15,711	3,399	31,316	921	8,554	15,056	3,775
Landscape Unit	Years 11 to 15					Years 16 to 20				
	Harvest	Rehab	Fertilized	Enhanced	WUI 600 sph	Harvest	Rehab	Fertilized	Enhanced	WUI 600 sph
Coldwater	2,213	21	170	1,136	163	2,595	97	92	1,204	260
Hayes	2,910	12	430	973	162	2,618	31	584	1,071	142
Lower Nicola	3,845	41	156	1,972	102	2,498	13	139	1,136	83
McNulty	1,359	-	195	819	0	2,245	2	123	1,192	5
Otter	2,089	13	456	1,020	64	1,921	37	362	874	231
Similkameen	2,768	32	536	1,130	78	2,797	3	431	990	87
Smith-Willis	3,264	5	568	1,460	4	2,791	34	541	1,194	81
Spus	3,682	76	125	1,898	112	2,415	107	337	1,234	113
Summers	1,334	63	848	572	125	2,272	103	555	1,350	197
Swakum	1,867	21	223	784	137	2,001	12	94	666	297
Tulameen	2,786	33	229	1,586	-	3,273	9	98	1,935	10
Upper Nicola	2,771	31	1,134	1,416	57	3,532	49	522	2,119	65
Total Area (ha)	30,888	348	5,070	14,768	1,005	30,959	496	3,878	14,965	1,571

The Harvest Plan produced annual harvest areas that ranged between approximately 6,178 and 6,550 hectares.

Based on an annual budget of \$3 million, the Silviculture Plan applies enhanced basic silviculture as the predominant silviculture treatment, followed by fertilization, then rehabilitation of stands impacted by Mountain Pine Beetle.

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 Merritt TSA.

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Document Revision History

Version	Date	Notes/Revisions
1.0	March 31, 2018	First version distributed to project team for review and comment.
1.1	July 5, 2018	Included various edits throughout for clarification and context.

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 Merritt 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 spatially-explicit plans developed in the Combined Scenario analysis for the Merritt 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 was derived from modelling outputs of the Combined Scenario. Results were queried and linked to generate spatial data for first four periods (20 years grouped into 5-year periods) and included treatment availability, as well as, the full extent of scheduled blocks. The spatial datasets were prepared similarly to operational planning datasets where scheduled blocks can be analyzed on additional operational criteria (e.g., slopes, volume/ha, potential benefits to non-timber values, the amount of remaining green volume, and site productivity). Given the large number of landscape units and biogeoclimatic zones in the Merritt TSA (Figure 1), this document includes succinct summaries of the indicators. Detailed statistics for each of the indicators are included into the accompanying MS Excel document.

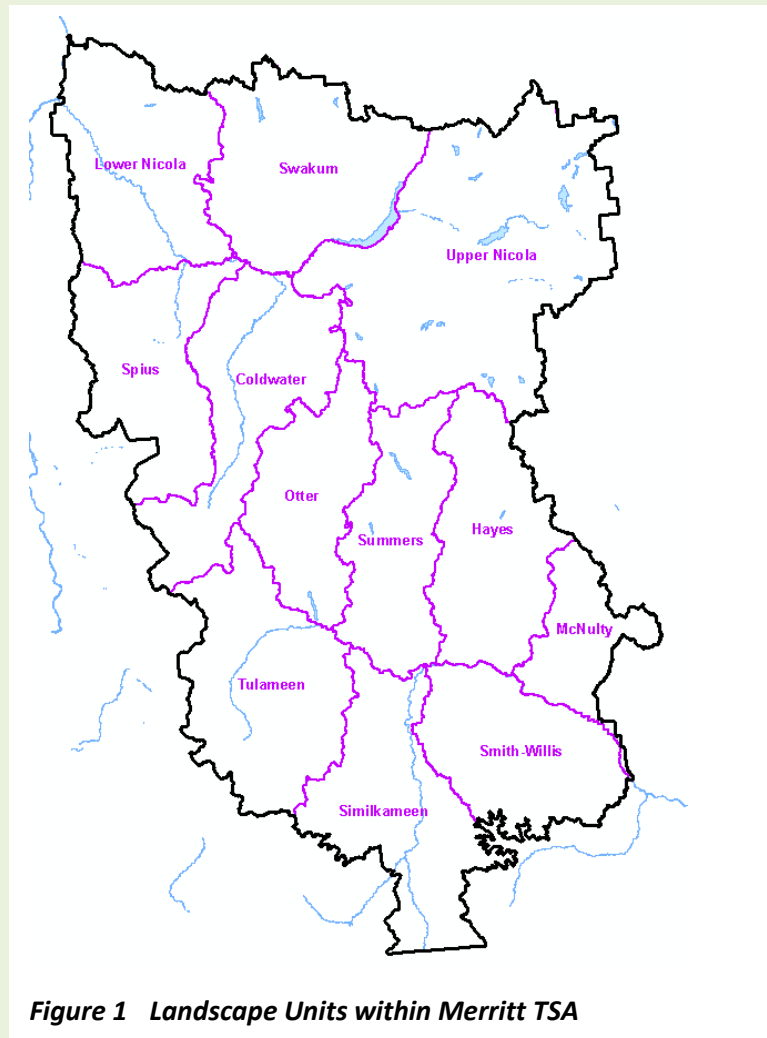


Figure 1 Landscape Units within Merritt TSA

3 Reserve Plan

The Reserve Plan was designed to answer the question, “Where and how should we reserve forested stands to address landscape-level biodiversity and non-timber values while minimizing impacts to the working forest?” The underlying purpose of this scenario was to explore tactics aimed at maintaining the harvest area while providing a wide range of values on the land base (i.e., co-location).

When developing the Combined Scenario, a run was completed to explore the option of using the results from the Reserve Scenario for the tactical plan. The candidate reserves determined in the ISS Reserve Scenario were locked from harvesting for the first 40 years. In addition, non-legal spatial Old Growth Management Areas (OGMA) were added back into the THLB, except for those areas that overlapped with a reserve. Because reserves were only locked from harvest for the first 40 years, the old seral requirements from the Non-spatial Old Growth Order were also implemented throughout the planning horizon.

Results from this run indicated that there was an impact to short-term harvest flows, due to the implementation of the old seral targets which were shown to be constraining in an ISS Base Case sensitivity analysis. However, long-term harvest levels were improved, due to an overall increase in the long-term timber harvesting land base (THLB) because OGMA were available for harvest.

Based on these results, and the fact that spatial OGMA have been established in Merritt to address both non-timber values and old seral requirements, it was decided that the reserve plan would not be used in the development of the tactical plan. Instead, a summary of the spatial OGMA was used for the Reserve Plan (Table 1 and Appendix 1). The District may choose to undertake a review of OGMA locations at some point in the future at which time the candidate reserves will be a useful tool in identifying alternative OGMA locations.

Table 1 Reserved Area by Landscape Unit and Seral Stage

Landscape Unit	Early	Mid	Mature	Old	Total
Coldwater	67	1,470	5,131	1,855	8,523
Hayes	99	860	3,833	1,943	6,735
Lower Nicola	22	1,676	11,611	4,914	18,223
McNulty	4	331	1,374	793	2,502
Otter	48	666	4,976	1,463	7,153
Similkameen	271	484	3,174	4,462	8,390
Smith-Willis	38	1,153	4,087	3,270	8,548
Spus	112	1,844	5,717	2,736	10,409
Summers	39	738	3,588	1,835	6,200
Swakum	355	586	5,150	2,251	8,341
Tulameen	96	2,579	7,065	6,092	15,832
Upper Nicola	301	988	6,040	1,071	8,399
Total Area (ha)	1,451	13,374	61,744	32,685	109,254

4 Harvest Plan

The Harvest Plan aimed to answer the question “Which stands should be prioritized for harvest/salvage in the short-term (and what are the mid/long-term consequences of not following this strategy)?” The underlying purpose of the Harvest Plan was to explore tactics aimed to improve timber harvesting opportunities, and to determine if harvesting could be used as a tool to reduce the impacts from wildfire

without unduly impacting timber supply. Three tactics were explored: 1) minimum harvest criteria, 2) harvest feasibility, and 3) wildfire management and harvest priority.

The following parameters were used to develop the Harvest Plan:

- Four minimum harvest criteria classes (75 to 100 m³/ha, 100 to 150 m³/ha, 150 to 200 m³/ha, and ≥ 200 m³/ha), with implementation of a minimum flow from stands with ≥ 200 m³/ha.
- “Smoothing” of the partial harvest flow over time.
- Managed stands must reach 95% of the culmination of mean annual increment, and be at least 60 years of age to be eligible for harvest.
- 0 to 1 hectare harvest “patches” were not allowed, and 1 to 5 hectare patches were limited to 5% of the harvest area.
- Minimum harvest criteria on slopes $> 45\%$ set to 150 m³/ha.
- Partial harvest not allowed on slopes $> 45\%$.
- Increased priority in the first 10 years for harvest from Wildland Urban Interfaces, Fuel Breaks, and stands with a Provincial Strategic Threat Analysis “Extreme” fire hazard rating.
- Reforestation of all harvest stands within Wildland Urban Interfaces using reduced stocking standards (“clumped” regeneration method, 600 stems per hectare).

Table 2 summarizes the volumes harvested each period by Landscape Unit, and silvicultural system while a further breakdown by BEC zone is provided in Appendix 1. Overall, partial harvesting accounts for about 3.6% of the total harvest area during the first 20 years.

Table 2 Harvested Area, by Landscape Unit, and Silviculture System

Landscape Unit/BEC	Years 1 to 5		Years 6 to 10		Years 11 to 15		Years 16 to 20	
	Clearcut	Partial Cut	Clearcut	Partial Cut	Clearcut	Partial Cut	Clearcut	Partial Cut
Coldwater	1,141	52	1,973	51	2,080	134	111	
Hayes	2,354	26	2,034	57	2,772	138	2,611	7
Lower Nicola	3,556	426	4,058	356	3,601	244	2,227	272
McNulty	1,272	29	1,339	-	1,351	8	2,228	18
Otter	1,870	50	2,080	83	1,988	100	1,777	144
Similkameen	4,801	66	5,129	23	2,687	80	2,751	46
Smith-Willis	2,957	33	2,091	83	3,214	50	2,723	69
Spus	3,409	70	2,649	49	3,660	22	2,391	24
Summers	1,386	106	1,175	100	1,258	76	2,201	72
Swakum	2,130	237	1,416	204	1,727	140	1,774	226
Tulameen	3,745	49	3,473	19	2,754	32	3,242	30
Upper Nicola	2,954	29	2,727	83	2,676	95	3,440	91
Total Area (ha)	31,575	1,174	30,142	1,109	29,770	1,118	29,881	1,078

Silviculture Systems: CC – Clearcut; PC – Partial Cut Harvesting

Table 3 provides a summary of harvest by slope class and landscape unit. Approximately 2.6% of the harvest during the first 20 years is from steeper slopes $\geq 45\%$.

Table 3 Harvested Area by Slope Class

Landscape Unit	Years 1 to 5		Years 6 to 10		Years 11 to 15		Years 16 to 20	
	< 45%	>= 45%	< 45%	>= 45%	< 45%	>= 45%	< 45%	>= 45%
Coldwater	1,138	56	1,938	86	2,105	109	2,495	101
Hayes	2,306	74	2,078	13	2,879	31	2,602	16
Lower Nicola	3,939	43	4,408	6	3,814	31	2,467	32
McNulty	1,300	1	1,339	-	1,353	6	2,240	5
Otter	1,881	39	2,107	56	2,047	42	1,903	18
Similkameen	4,672	195	4,834	317	2,634	133	2,730	67
Smith-Willis	2,957	33	2,148	26	3,261	3	2,753	38
Spius	3,292	188	2,632	66	3,588	94	2,320	95
Summers	1,477	15	1,242	32	1,312	22	2,212	60
Swakum	2,362	6	1,620	-	1,867	-	2,001	-
Tulameen	3,368	427	3,298	194	2,497	290	3,094	179
Upper Nicola	2,966	16	2,805	5	2,755	16	3,524	7
Total Area (ha)	31,657	1,095	30,451	801	30,110	777	30,341	618

Table 4 provides a summary of harvest by volume class. Approximately 8.5% of the area harvested during the first 20 years is from stands with 75 to 100 m³/ha, and 23.1% of the area harvested is from stands with 100 to 150 m³/ha.

Table 4 Harvested Area by Volume Class

Landscape Unit	Years 1 to 5					Years 6 to 10				
	75-100 m ³ /ha	100-150 m ³ /ha	150-200 m ³ /ha	>=200 m ³ /ha	Partial Cutting	75-100 m ³ /ha	100-150 m ³ /ha	150-200 m ³ /ha	>=200 m ³ /ha	Partial Cutting
Coldwater	131	250	272	488	52	159	518	380	915	51
Hayes	149	394	289	1,523	26	286	311	396	1,041	57
Lower Nicola	410	1,778	744	624	426	515	2,178	803	561	356
McNulty	118	82	124	948	29	78	162	157	941	-
Otter	72	648	255	895	50	149	782	349	801	83
Similkameen	284	765	887	2,865	66	290	582	1,036	3,221	23
Smith-Willis	157	423	770	1,607	33	214	443	622	812	83
Spius	251	652	902	1,605	70	157	645	567	1,279	49
Summers	170	414	308	494	106	182	260	264	469	100
Swakum	303	679	449	699	237	195	531	235	455	204
Tulameen	237	313	355	2,840	49	114	194	233	2,932	19
Upper Nicola	246	869	620	1,219	29	240	802	735	950	83
Total Area (ha)	2,528	7,267	5,974	15,806	1,174	2,580	7,409	5,778	14,376	1,109
Landscape Unit	Years 11 to 15					Years 16 to 20				
	75-100 m ³ /ha	100-150 m ³ /ha	150-200 m ³ /ha	>=200 m ³ /ha	Partial Cutting	75-100 m ³ /ha	100-150 m ³ /ha	150-200 m ³ /ha	>=200 m ³ /ha	Partial Cutting
Coldwater	354	507	420	798	134	411	802	376	928	79
Hayes	327	334	731	1,380	138	316	472	678	1,145	7
Lower Nicola	270	2,001	810	519	244	299	1,161	527	239	272
McNulty	38	83	207	1,024	8	10	225	317	1,675	18
Otter	152	650	421	765	100	125	663	331	657	144
Similkameen	122	304	629	1,632	80	275	319	589	1,568	46
Smith-Willis	357	371	880	1,607	50	235	487	751	1,250	69
Spius	176	585	748	2,151	22	199	554	375	1,262	24
Summers	174	303	383	398	76	394	524	416	866	72
Swakum	182	740	315	490	140	230	821	200	524	226
Tulameen	85	152	226	2,291	32	39	378	199	2,627	30
Upper Nicola	352	845	556	922	95	500	1,085	796	1,059	91
Total Area (ha)	2,590	6,875	6,328	13,976	1,118	3,034	7,492	5,555	13,800	1,078

The risk of loss due to wildfire was mitigated by instructing the forest estate model to prioritize harvesting for the first 10 years in stands located within Wildland Urban Interfaces, proposed Fuel Breaks, and stands that are rated as “Extreme Threat” by the 2015 Provincial Strategic Threat Analysis (PSTA) (Table 5). In addition, stands harvested using a clearcut system within Wildland Urban Interfaces were regenerated using reduced stocking standards at 600 stems per hectare (sph).

Table 5 Harvest Area and Regeneration with Reduced Stocking by Fire Management Category

Landscape Unit	Years 1 to 5					Years 6 to 10				
	WUI	Fuel Break Priority “0”	Fuel Break Priority “1”	PSTA Extreme Stands	WUI Regen 600 sph	WUI	Fuel Break Priority “0”	Fuel Break Priority “1”	PSTA Extreme Stands	WUI Regen 600 sph
Coldwater	365	99	62	502	346	530	211	52	1,035	826
Hayes	323	453	-	715	299	354	286	-	1,019	619
Lower Nicola	297	659	34	2,391	157	393	540	23	2,703	511
McNulty	53	282	-	1,075	21	64	198	-	1,017	86
Otter	379	172	-	552	342	600	202	-	506	892
Similkameen	590	789	11	3,525	635	445	1,182	7	3,876	1,106
Smith-Willis	149	317	-	2,009	221	261	188	-	1,246	448
Spilus	203	526	63	1,682	184	181	454	21	1,210	336
Summers	586	142	-	358	529	468	168	-	297	1,016
Swakum	333	41	89	968	223	424	47	84	581	512
Tulameen	238	575	-	3,039	230	150	545	-	2,950	382
Upper Nicola	195	19	111	1,329	212	240	19	205	1,248	441
Total Area (ha)	3,712	4,074	370	18,145	3,399	4,109	4,038	393	17,688	7,174

To reduce small blocks and favour larger ones, harvest opening sizes in each 5-year period were controlled in the model. Table 6 and Table 7 show the targets and resulting opening size distributions for clearcut and partial harvesting, respectively.

Table 6 Clearcut Opening size Distribution for the First 20 Years

Size Class	Target	Period 1	Period 2	Period 3	Period 4
0-1 ha	0%	0%	0%	0%	0%
1-5 ha	0-5%	5%	5%	5%	5%
5-20 ha	5-50%	34%	37%	35%	41%
20-100 ha	10-70%	47%	45%	46%	47%
100+ ha	0-10%	14%	13%	14%	7%

Table 7 Partial Cut Opening Size Distribution for the First 20 Years

Size Class	Target	Period 1	Period 2	Period 3	Period 4
0-1 HA	0%	0%	0%	0%	0%
1-5 ha	0-5%	5%	5%	5%	5%
5-20 ha	10-50%	53%	52%	61%	53%
20-100 ha	10-80%	42%	43%	34%	42%
100+ ha	0-15%	0%	0%	0%	0%

5 Silviculture Plan

The Silviculture Plan was designed to answer the question, “Are there alternatives to current basic silviculture practices that would benefit future outcomes (both timber and non-timber)?” The

underlying purpose of this plan was to explore tactics aimed to enhance timber quantity and quality over the mid- and long-term, as well as, improve biodiversity, wildlife habitat, and cultural interests. The Project Team identified 3 tactics to be explored: 1) rehabilitation of MPB impacted stands, 2) fertilization, and 3) enhanced basic silviculture. These tactics were explored by applying average treatment costs (Table 8) and a funding level of \$3 million per year for the first 20 years.

Table 8 Unit costs applied for silviculture tactics

Treatment	Unit Cost
Marginally Economic Rehab ($\geq 50\text{m}^3/\text{ha}$)	\$1,500/ha
Uneconomic Rehab ($<50\text{m}^3/\text{ha}$)	\$2,000/ha
Fertilization (1 or 2 treatments)	\$450/ha each application of PI and Fd \$600/ha each application of multiple Sx treatments
Enhanced Silviculture	\$450/ha – incremental planning of trees sown with select seed \$1,000/ha – switch from natural to planted

The area allocated to rehabilitation of MPB impacted stands, fertilization, and enhanced basic silviculture was chosen by the model using the following criteria:

- Enhanced basic silviculture limited to 50 % of the clearcut harvest area in the period.
- Priority on increasing short/mid-term harvest flows, followed by long-term harvest flows.

Figure 2 shows the area treated and cost for each of the silviculture treatment options. The numbers in this figure were averaged per year by period.

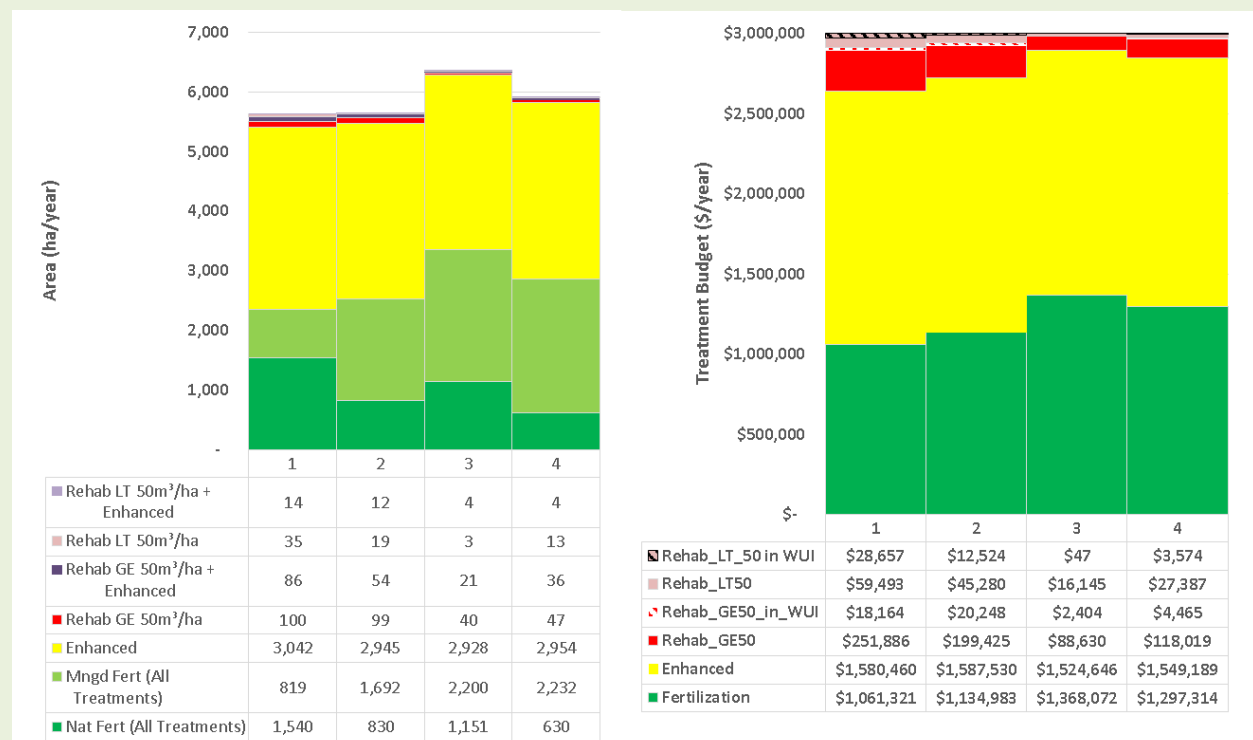


Figure 2 Managed Area and Cost associated with Silviculture Treatments

The subsections below briefly describe elements considered for modelling and subsequent mapping of treatment opportunities and priorities for each of the three tactics modelled (i.e., rehabilitation, fertilization, and enhanced basic silviculture), and summarize results for area treated (e.g., in each 5-

year period and by Landscape Unit). **Note that this information is provided as background information and these modelling assumptions should not be interpreted as exclusive treatment direction.**

5.1 Rehabilitation

Rehabilitation focuses on improving poorly performing stands severely impacted by MPB to provide more harvest opportunities during the forecasted timber supply shortage (mid-term) while increasing the effective landbase in the long-term.

Following the salvage period, some stands are not expected to recover to reach the minimum merchantability criteria to harvest again within the planning horizon. These stands effectively cease to contribute to the allowable annual cut (AAC). A continuum of stands exists within this profile; ranging from uneconomic to marginally economic:

- Uneconomic stands: younger, small-diameter trees, higher percent dead (less than 50 m³/ha live volume)
- Marginally economic stands: trees with some green volume and larger piece sizes to produce lumber, pulp chips or possibly bio-fuel feed stocks (greater than or equal to 50 m³/ha live volume).

In some situations, rehabilitation treatments may harvest trees that are still merchantable (e.g., green) and deliver them to a mill for processing. These logs would not have otherwise contributed to the annual harvest.

Objectives

Rehabilitation typically involves the removal of standing and fallen trees, site preparation and reforestation of productive stands with suitable tree species. Key objectives of rehabilitation activities include:

- Abate fire hazards associated with standing dead trees and damage to understory trees as the dead material falls.
- Accelerate the recovery of stands into productive forests that will be available for harvest sooner (e.g., younger stands without merchantable volume, including fire-damaged areas).
- Recover some merchantable (green) volume from unsalvaged stands that would not otherwise be harvested – particularly in the mid-term.

Eligibility, Costs, and Responses

Criteria applied to identify and prioritize eligible stands, apply costs, and implement responses are detailed in Table 9. Operational criteria that should be used to identify or prioritize stands in the field include: 1) potential benefits to non-timber values, 2) amount of remaining green volume, 3) site productivity, 4) distance from communities, 4) access difficulties, and 5) proximity to appropriate seed sources.

Table 9 Rehabilitation Eligibility, Costs, and Responses

Element	Description	Criteria
Eligible Stands	Unlogged existing natural stands by the end of the salvage period	<ul style="list-style-type: none"> ○ Conifer Leading ○ Slope <=35% (i.e., Ground Harvest System) ○ >=40% stand percentage dead ○ <=100 m³/ha live volume at the end of salvage period, or live + dead volume during the salvage period ○ Stand Age >=40 yrs at time of MPB attack ○ BEC: SBS, ESSF ○ Managed Stand Site Index: <ul style="list-style-type: none"> ● IDF: Fd mSI >17.0; Pl mSI >17.8; Sx mSI >16.1 ● MS: : Fd mSI >18.0; Pl mSI >17.3; Bl mSI >17.3; Sx mSI >17.3 ● ESSF: Fd mSI >15.0; Pl mSI >14.1; Bl mSI >15.8; Sx mSI >14.7
Timing	Period within the planning horizon	○ First 20 years
Costs	Marginally Economic (>= 50m ³ /ha) - Harvest/Knockdown/Site Prep/Plant	○ \$1,500/ha (Knockdown and Site Prep (\$500/ha) and Planting (\$1,000/ha))
	Uneconomic (<50m ³ /ha) - Knockdown/Site Prep/Plant	○ \$2,000/ha (Knockdown and Site Prep (\$1,000/ha) and Planting (\$1,000/ha))
	Wildland Urban Interface Incentive	○ Reduce cost by \$500/ha
Treatment Response	Transition stands onto future managed stands as if harvested	<ul style="list-style-type: none"> ○ Regular future AUs, or enhanced future AU (where stand eligibility overlaps). ○ The volume harvested from these stands was included in the overall harvest volume.

The spatial outputs require field verification that should include but are not limited to these other criteria to identify or prioritize stands: potential benefits to non-timber values, the amount of remaining green volume, site productivity, access difficulties, and proximity to appropriate seed sources.

Stand response for rehabilitation was modelled by transitioning stands onto future managed stands from the treatment date. Accordingly, these responses take advantage of improved stocking, lower regeneration delay, and select seed to produce higher yields that achieve minimum harvest volumes much sooner. The Combined Scenario analysis showed that these stand regeneration improvements contribute to the harvest rate in the long-term and at the end of mid-term period. Moreover, some of the rehabilitated stands may undergo enhanced basic silviculture options that provide additional contributions to the harvest flow.

Challenges

A significant challenge with this strategy involves the identification of stands that would not otherwise regenerate into merchantable stands on their own, while maximizing return on investment. This is because the analysis data does not include some spatially-explicit, stand-level criteria required to distinguish the viability of some treatments.

Very little direct information was available to develop stand-level assumptions for rehabilitating non-salvaged stands so some aspects of the applied assumptions may not be operationally appropriate in all cases.

Operational plans for rehabilitation treatments should carefully consider potential issues related to non-timber values such as water quality where additional disturbance could exacerbate impacts from increased sedimentation¹.

¹ See Post-Natural Disturbance Forest Retention Guidance: 2017 Wildfires, by Diane Nicholls ADM CF and Tom Ethier ADM, Juan 19, 2018 for added direction.

The success of this activity depends, in part, on the proponents developing opportunities to improve utilization of merchantable material, improve markets for low quality fibre, and potentially claim carbon credits.

Results

The area rehabilitated under the silviculture plan steadily decreases over the 20 year planning period as shown in Table 10 and Table 11 for rehabilitation of economic and uneconomic stands, respectively. These tables also provide eligible areas over each period while a further breakdown by BEC Zone is provided in Appendix 3 and Appendix 4.

Table 10 Area Eligible and Treated for Economic Rehabilitation

Landscape Unit/BEC	Years 1 to 5		Years 6 to 10		Years 11 to 15		Years 16 to 20	
	Eligible	Treated	Eligible	Treated	Eligible	Treated	Eligible	Treated
Coldwater	606	46	663	63	688	18	638	89
Hayes	717	129	797	54	758	12	788	21
Lower Nicola	312	31	353	39	362	32	379	13
McNulty	4	-	4	2	4	-	4	2
Otter	184	20	370	40	399	13	393	27
Similkameen	997	197	1,200	109	1,202	28	1,117	3
Smith-Willis	423	119	427	44	448	5	436	18
Spilus	735	118	753	70	843	74	870	81
Summers	1,229	156	1,274	226	1,343	60	1,350	96
Swakum	418	24	485	70	522	21	410	10
Tulameen	134	19	200	5	220	33	224	9
Upper Nicola	456	74	703	43	765	11	863	48
Total Area (ha)	6,215	930	7,229	766	7,553	307	7,472	416

Table 11 Area Eligible and Treated for Uneconomic Rehabilitation

Landscape Unit/BEC	Years 1 to 5		Years 6 to 10		Years 11 to 15		Years 16 to 20	
	Eligible	Treated	Eligible	Treated	Eligible	Treated	Eligible	Treated
Coldwater	28	3	45	1	55	3	119	8
Hayes	79	15	114	10	183	-	167	10
Lower Nicola	18	3	25	16	48	9	56	-
McNulty	-	-	-	-	-	-	-	-
Otter	14	5	27	-	33	-	44	10
Similkameen	143	42	153	43	255	4	421	0
Smith-Willis	149	89	154	11	165	-	198	16
Spilus	73	15	133	13	155	2	187	26
Summers	148	26	159	37	192	3	203	8
Swakum	65	30	68	7	78	-	205	2
Tulameen	-	-	-	-	-	-	-	-
Upper Nicola	98	15	45	17	92	20	98	0
Total Area (ha)	814	244	923	155	1,256	41	1,698	80

5.2 Fertilization

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 while fertilized stands significantly contribute to the harvest flow in the mid-term (i.e., years 30 to 50 of the planning horizon), there is no immediate incentive to fertilize with single applications since there is a time gap

between the fertilization application and final harvest. However, early and successive applications of fertilizer can improve mid-term harvest flows even more.

Objective

Fertilization is used to increase volume available for harvest and can be useful when attempting to mitigate a mid-term shortfall in timber supply. Key objectives of fertilization activities include:

- Accelerate the rate of stand development;
- Increase merchantable yield and value of stands harvested within the mid-term.

Eligibility, Costs, and Responses

Criteria applied to identify and prioritize eligible stands, apply costs, and implement responses are detailed in Table 12. Within this 20-year tactical plan, eligible stands can undergo one or two consecutive applications 10-years apart. Eligible Sx stands could undergo between 1 and 4 treatments spaced 5 years apart to take advantage of increased responses of multiple treatments. To maximize return on investment, harvesting fertilized stands is avoided for 10 years following application.

Table 12 Fertilization Eligibility, Costs, and Responses

Table 22: Fertilization Eligibility, Costs, and Response

Element	Description	Criteria																				
Eligible Stands	Existing natural stands not impacted by MPB/IBS	<ul style="list-style-type: none">○ Age 30 to 80○ Sx + PI >=80%○ BEC: MS, ESSF, IDF dk1, dk2 (non-dry-belt)○ Slope <=45% for the entire stand○ Managed SI:<ul style="list-style-type: none">• IDF: Sx 16.1, Fir 17.0, Pine 17.8• MS: Sx mSI >17.3; Fd mSI >18.0; PI mSI >17• ESSF: Sx mSI >14.7; Fd mSI >15.0; PI mSI >14.1																				
	Existing managed stands not impacted by MPB/IBS	<ul style="list-style-type: none">○ Age 25 to 55○ Fd + Sx + PI >=80%○ BEC: MS, ESSF, IDF dk1, dk2 (non-dry-belt)○ Slope <=45% for the entire stand○ Managed SI:<ul style="list-style-type: none">• IDF: Sx 16.1, Fir 17.0, Pine 17.8• MS: Sx mSI >17.3; Fd mSI >18.0; PI mSI >17• ESSF: Sx mSI >14.7; Fd mSI >15.0; PI mSI >14.1																				
Costs	Fertilization costs for all stands	<ul style="list-style-type: none">○ \$450 per hectare for each treatment application of PI and Fd○ \$600 per hectare each treatment (multiple Sx treatments)																				
Timing Windows	Minimum and Maximum age defining opportunity window, for up to 2 applications, every 10 years	<table><tr><th>Applications (every 10 yrs)</th><th>Age Window (yrs)</th><th>Fd-Leading (m³/ha)</th><th>PI-Leading (m³/ha)</th><th>Natural (m³/ha)</th></tr><tr><td>1</td><td>30 – 80</td><td>15</td><td>12</td><td>10</td></tr><tr><td>2</td><td>30 – 70</td><td>30</td><td>24</td><td>20</td></tr></table>	Applications (every 10 yrs)	Age Window (yrs)	Fd-Leading (m³/ha)	PI-Leading (m³/ha)	Natural (m³/ha)	1	30 – 80	15	12	10	2	30 – 70	30	24	20					
Applications (every 10 yrs)	Age Window (yrs)	Fd-Leading (m³/ha)	PI-Leading (m³/ha)	Natural (m³/ha)																		
1	30 – 80	15	12	10																		
2	30 – 70	30	24	20																		
Treatment Response	Growth increase 10 years after application (entire stand)	<p>All at 100% Efficiency</p> <table><tr><th>Applications (every 5 yrs)</th><th>Age Window (yrs)</th><th>Sx-Leading (m³/ha)</th><th>Efficiency</th></tr><tr><td>1</td><td>30 – 80</td><td>15</td><td>100%</td></tr><tr><td>2</td><td>25 – 55</td><td>49</td><td>100%</td></tr><tr><td>3</td><td>25 – 50</td><td>89</td><td>100%</td></tr><tr><td>4</td><td>25 - 45</td><td>132</td><td>100%</td></tr></table> <p>All at 100% Efficiency</p>	Applications (every 5 yrs)	Age Window (yrs)	Sx-Leading (m³/ha)	Efficiency	1	30 – 80	15	100%	2	25 – 55	49	100%	3	25 – 50	89	100%	4	25 - 45	132	100%
Applications (every 5 yrs)	Age Window (yrs)	Sx-Leading (m³/ha)	Efficiency																			
1	30 – 80	15	100%																			
2	25 – 55	49	100%																			
3	25 – 50	89	100%																			
4	25 - 45	132	100%																			
Transitions to future stands		Locked from harvesting, 10 years after last 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.

Results

Areas eligible for and treated with fertilizer are summarized in Table 13 (Natural Stands) and Table 14 (Managed Stands), while a further breakdown by BEC Zone is provided in Appendix 5 and Appendix 6. Fertilization activities under the silviculture plan steadily increase over the 20 year planning period. Note that these tables do not show how many treatments were applied to each stand; these treated areas only include the first application.

Table 13 Area of Natural Stands Eligible for and Treated with Fertilization

Landscape Unit/BEC	Years 1 to 5		Years 6 to 10		Years 11 to 15		Years 16 to 20	
	Eligible	Treated	Eligible	Treated	Eligible	Treated	Eligible	Treated
Coldwater	1,169	292	926	215	881	42	660	92
Hayes	3,826	1,314	2,132	375	1,869	48	1,755	119
Lower Nicola	471	181	124	45	124	-	115	13
McNulty	535	346	491	101	491	116	487	37
Otter	1,492	493	1,235	374	1,195	29	1,114	44
Similkameen	2,514	893	1,668	569	1,446	148	1,294	53
Smith-Willis	2,000	941	1,599	461	1,539	102	1,050	99
Spilus	2,969	855	2,464	740	2,369	83	2,245	223
Summers	1,809	376	1,238	190	1,180	117	1,106	152
Swakum	552	222	469	88	414	54	326	12
Tulameen	1,543	650	1,242	378	1,242	86	1,185	96
Upper Nicola	4,972	1,138	2,777	611	2,485	303	2,091	186
Total Area (ha)	23,851	7,699	16,366	4,149	15,236	1,129	13,429	1,126

Table 14 Area of Managed Stands Eligible for and Treated with Fertilization

Landscape Unit/BEC	Years 1 to 5		Years 6 to 10		Years 11 to 15		Years 16 to 20	
	Eligible	Treated	Eligible	Treated	Eligible	Treated	Eligible	Treated
Coldwater	205	74	252	32	755	128	1,263	0
Hayes	3,085	861	4,545	625	7,729	382	8,843	465
Lower Nicola	642	131	791	70	1,480	156	2,886	126
McNulty	335	62	572	186	1,184	79	1,306	86
Otter	1,806	465	3,247	489	5,181	427	7,315	318
Similkameen	1,390	253	3,825	695	5,748	389	6,123	378
Smith-Willis	1,467	312	3,357	424	4,335	466	5,041	442
Spilus	1,221	387	1,343	322	1,494	42	1,687	114
Summers	1,925	387	3,133	563	5,652	732	8,305	403
Swakum	1,036	260	1,566	248	2,004	168	4,701	82
Tulameen	395	87	532	64	741	143	1,030	2
Upper Nicola	2,601	813	3,875	687	7,983	831	14,575	336
Total Area (ha)	16,108	4,093	27,038	4,405	44,287	3,942	63,076	2,752

5.3 Enhanced Silviculture

Enhanced basic silviculture activities generally produce additional volume later than fertilization as these stands have not been established yet. However, the stands may become available for harvest sooner than regular managed stands as a result of dropping the requirement to reach at least 60 years of age, and the possibility that 95% of culmination of mean annual increment may be reached earlier. In addition to the timber supply benefits, the higher density stands developed through this activity are expected to improve timber quality through reduced knot sizes, lower risks from damaging agents and other risks attributed to climate change, as well as, increased options 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

Criteria applied to identify and prioritize eligible stands, apply costs, and implement responses are detailed in Table 15.

Table 15 Enhanced Silviculture Eligibility, Costs, and Responses

Element	Description	Criteria
Eligible Stands	All clearcut stands	o All future managed stands following clearcut treatment
Timing	All stands harvested in the model	
Costs	Incremental planting of trees sown with select seed	\$450/ha
	Switch from natural to planted	\$1,000/ha
Treatment Response	Transition to future enhanced managed stands that remain enhanced after the 20-year period	
	Regeneration method	Switch from natural regeneration to planting where possible
	Density	Increase to 1,800 stems/ha (with genetic gains)
	Genetic gains	No changes from current
	Regeneration delay	Decrease by 1 year (2 to 1 years or 3 to 2 years)
	OAF1	From 85% to 89%

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. Implementation of a similar approach here may take up to 5 years to develop.

Results

Table 16 shows that area treated with enhanced basic silviculture tactics under the silviculture plan are relatively stable over the 20 year planning period. The Combined Scenario analysis showed that enhanced basic silviculture tactics significantly contribute to the harvest flow immediately following the mid-term and well into the long-term.

Table 16 Eligible, and Treated Areas for Enhanced Basic Silviculture

Landscape Unit/BEC	Years 1 to 5		Years 6 to 10		Years 11 to 15		Years 16 to 20	
	Eligible	Treated	Eligible	Treated	Eligible	Treated	Eligible	Treated
Coldwater	16,194	385	16,809	927	17,423	1,136	17,776	1,204
Hayes	18,076	985	19,276	848	19,890	973	20,265	1,071
Lower Nicola	19,495	2,070	20,052	2,042	20,204	1,972	20,598	1,136
McNulty	15,082	704	15,286	693	15,538	819	16,003	1,192
Otter	12,095	904	12,463	925	12,683	1,020	12,885	874
Similkameen	26,269	1,879	27,759	2,489	28,818	1,130	29,550	990
Smith-Willis	18,997	1,247	19,596	804	20,498	1,460	21,575	1,194
Spisus	21,086	2,239	21,705	1,781	22,450	1,898	23,490	1,234
Summers	10,185	602	10,812	646	11,127	572	11,345	1,350
Swakum	11,134	938	11,325	565	11,459	784	11,545	666
Tulameen	26,712	2,007	27,485	2,056	28,020	1,586	28,477	1,935
Upper Nicola	20,744	1,751	21,799	1,279	22,435	1,416	23,263	2,119
Total Area (ha)	216,069	15,711	224,369	15,056	230,545	14,766	236,773	14,964

6 Discussion

This tactical plan provides guidance to forest professionals in developing operational plans that identify specific stands for treatment. It was developed using modelling outputs from the ISS Combined Scenario. It must be stressed that the spatial data used to develop the Combined Scenario were typically forest-level inventories and direct applications for operational and stand-level planning are limited. Rather, these data are appropriate for guiding planners to areas where more detailed fieldwork can be done to assess potential treatment opportunities. Ultimately, following the tactical plan should provide the best chance for achieving the future forest condition presented in the Combined Scenario.

The exercise of incorporating operational criteria into the tactical plan highlighted new constraints that could be added to future stewardship strategies. 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 Merritt TSA.

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

Appendix 1 Reserve (OGMA) Area by Landscape Unit, BECv5 Zone, and Seral Stage

Landscape Unit/BECv5	Early	Mid	Mature	Old	Total
Coldwater	67	1,470	5,131	1,855	8,523
AT		67	399	45	512
BG			6		6
CWH	1		91	33	125
ESSF	12	858	1,574	447	2,891
IDF	39	454	2,635	533	3,661
MS	16	90	365	768	1,238
PP	1		60	29	90
Hayes	99	860	3,833	1,943	6,735
ESSF	2	1	235	48	286
IDF	66	679	3,326	481	4,553
MS	32	179	272	1,414	1,896
Lower Nicola	22	1,676	11,611	4,914	18,223
BG			132		132
ESSF		244	34	598	876
IDF	4	766	8,781	2,225	11,776
MS	19	591	168	1,722	2,499
PP		75	2,495	369	2,939
McNulty	4	331	1,374	793	2,502
ESSF	3	2	619	134	759
IDF		320	714	172	1,206
MS	0	8	41	487	537
Otter	48	666	4,976	1,463	7,153
ESSF	21	72	117	411	620
IDF	24	570	4,739	743	6,076
MS	4	25	120	309	458
Similkameen	271	484	3,174	4,462	8,390
AT		2	87	11	101
ESSF	7	267	1,002	2,071	3,347
IDF	217	143	1,628	845	2,834
MS	46	72	456	1,534	2,108
Smith-Willis	38	1,153	4,087	3,270	8,548
ESSF	9	63	691	642	1,405
IDF	9	1,034	3,204	1,186	5,433
MS	20	56	192	1,442	1,709
Spius	112	1,844	5,717	2,736	10,409
AT		61	262	17	340
ESSF	12	1,031	2,753	995	4,791
IDF	75	521	2,459	476	3,531
MS	7	221	178	1,241	1,648
PP	17	11	65	6	99
Summers	39	738	3,588	1,835	6,200
ESSF	0	58	11	117	187
IDF	31	630	3,407	1,183	5,251
MS	7	50	170	535	762
Swakum	355	586	5,150	2,251	8,341
BG			0	6	6
ESSF		25	3		28
IDF	150	403	4,242	726	5,522
MS	138	120	270	1,040	1,568
PP	66	39	635	478	1,218
Tulameen	96	2,579	7,065	6,092	15,832
AT		92	313	63	468

Landscape Unit/BECv5	Early	Mid	Mature	Old	Total
CWH		4	467	34	505
ESSF	82	2,284	4,500	5,125	11,991
IDF	2	98	1,375	127	1,602
MH			94	124	218
MS	11	101	315	620	1,047
Upper Nicola	301	988	6,040	1,071	8,399
BG		11	2		13
ESSF	1		115		116
IDF	112	942	5,505	321	6,881
MS	188	34	398	750	1,370
PP			20		20
Total Area (ha)	1,451	13,374	61,744	32,685	109,254

Note: seral stages assessed at 2017

Appendix 2 *Harvested Area by Landscape Unit, BEC Zone and Silviculture System*

Landscape Unit/BEC	Years 1 to 5		Years 6 to 10		Years 11 to 15		Years 16 to 20	
	Clearcut	Partial Cut	Clearcut	Partial Cut	Clearcut	Partial Cut	Clearcut	Partial Cut
Coldwater	1,141	52	1,973	51	2,080	134	111	
CWH	27	-	124	-	109	-	111	-
ESSF	190	-	607	-	467	-	562	-
IDF	684	52	986	51	1,212	134	1,279	79
MS	231	-	226	-	277	-	515	-
PP	10	-	30	-	14	-	50	-
Hayes	2,354	26	2,034	57	2,772	138	2,611	7
ESSF	287	-	164	-	251	-	310	-
IDF	378	26	398	57	331	138	299	7
MS	1,690	-	1,472	-	2,189	-	2,002	-
PP	-	-	-	-	-	-	-	-
Lower Nicola	3,556	426	4,058	356	3,601	244	2,227	272
ESSF	315	-	226	-	462	-	151	-
IDF	1,832	426	2,024	356	1,873	243	1,003	269
MS	1,209	-	1,661	-	1,211	-	1,014	-
PP	200	0	147	0	55	1	59	3
McNulty	1,272	29	1,339	-	1,351	8	2,228	18
ESSF	304	-	447	-	629	-	1,063	-
IDF	133	29	131	-	204	8	121	18
MS	835	-	760	-	518	-	1,044	-
Otter	1,870	50	2,080	83	1,988	100	1,777	144
ESSF	97	-	51	-	184	-	67	-
IDF	1,179	50	1,538	83	1,330	100	1,213	144
MS	594	-	490	-	474	-	497	-
Similkameen	4,801	66	5,129	23	2,687	80	2,751	46
ESSF	1,114	-	2,200	-	817	-	1,124	-
IDF	675	66	654	23	363	80	451	46
MS	3,011	-	2,275	-	1,507	-	1,175	-
PP	1	-	-	-	-	-	-	-
Smith-Willis	2,957	33	2,091	83	3,214	50	2,723	69
ESSF	72	-	118	-	403	-	555	-
IDF	757	33	824	83	899	50	948	69
MS	2,127	-	1,150	-	1,912	-	1,220	-
PP	2	-	-	-	-	-	-	-
Spius	3,409	70	2,649	49	3,660	22	2,391	24
ESSF	1,317	-	981	-	1,734	-	1,191	-
IDF	771	70	720	49	899	22	572	24
MH	10	-	42	-	-	-	7	-
MS	1,312	-	895	-	1,028	-	620	-
PP	-	-	9	-	-	-	-	-
Summers	1,386	106	1,175	100	1,258	76	2,201	72
ESSF	69	-	32	-	54	-	74	-
IDF	863	106	742	100	659	76	1,285	72
MS	453	-	399	-	545	-	840	-
PP	-	-	2	-	-	-	1	-
Swakum	2,130	237	1,416	204	1,727	140	1,774	226
IDF	1,274	237	800	184	1,292	128	1,269	226
MS	856	-	610	-	435	-	490	-
PP	0	-	5	20	-	12	15	-
Tulameen	3,745	49	3,473	19	2,754	32	3,242	30
ESSF	2,070	-	2,570	-	1,808	-	2,352	-
IDF	176	49	70	19	40	32	62	30

Landscape Unit/BEC	Years 1 to 5		Years 6 to 10		Years 11 to 15		Years 16 to 20	
	Clearcut	Partial Cut	Clearcut	Partial Cut	Clearcut	Partial Cut	Clearcut	Partial Cut
MS	1,499	-	833	-	907	-	829	-
Upper Nicola	2,954	29	2,727	83	2,676	95	3,440	91
BG	1	-	4	-	3	-	-	-
ESSF	109	-	67	-	57	-	74	-
IDF	1,634	29	1,464	83	1,802	95	2,264	91
MS	1,210	-	1,192	-	800	-	1,082	-
PP	-	-	-	-	15	-	21	-
Total Area (ha)	31,575	1,174	30,142	1,109	29,770	1,118	29,881	1,078

Appendix 3 Economic Rehabilitation - Eligible and Treated Area

	Years 1 to 5		Years 6 to 10		Years 11 to 15		Years 16 to 20	
Landscape Unit/BEC	Eligible	Treated	Eligible	Treated	Eligible	Treated	Eligible	Treated
Coldwater	606	46	663	63	688	18	638	89
CWH	-	-	-	-	-	-	-	-
ESSF	75	0	75	12	75	1	80	0
IDF	157	23	205	35	214	12	216	24
MS	373	22	383	16	399	6	343	65
PP	-	-	-	-	-	-	-	-
Hayes	717	129	797	54	758	12	788	21
ESSF	-	-	-	-	-	-	-	-
IDF	333	29	307	14	308	6	299	19
MS	384	100	490	41	450	5	489	3
PP	-	-	-	-	-	-	-	-
Lower Nicola	312	31	353	39	362	32	379	13
ESSF	38	-	39	-	39	-	44	2
IDF	14	5	3	-	7	6	7	-
MS	260	26	311	39	316	26	328	10
PP	-	-	-	-	-	-	-	-
McNulty	4	-	4	2	4	-	4	2
ESSF	-	-	-	-	-	-	-	-
IDF	-	-	-	-	-	-	-	-
MS	4	-	4	2	4	-	4	2
Otter	184	20	370	40	399	13	393	27
ESSF	6	-	6	-	6	-	6	-
IDF	108	17	238	16	240	0	239	13
MS	71	3	127	25	153	13	149	13
Similkameen	997	197	1,200	109	1,202	28	1,117	3
ESSF	106	25	118	1	126	-	133	0
IDF	208	65	259	22	243	9	250	0
MS	684	107	822	87	834	19	735	2
PP	-	-	-	-	-	-	-	-
Smith-Willis	423	119	427	44	448	5	436	18
ESSF	-	-	-	-	-	-	-	-
IDF	265	103	279	18	268	-	271	16
MS	158	16	148	27	180	5	165	2
PP	-	-	-	-	-	-	-	-
Spius	735	118	753	70	843	74	870	81
ESSF	200	29	185	13	212	22	270	30
IDF	48	4	34	-	33	0	33	-
MH	-	-	-	-	-	-	-	-
MS	487	86	534	57	598	51	567	51
PP	-	-	-	-	-	-	-	-
Summers	1,229	156	1,274	226	1,343	60	1,350	96
ESSF	37	-	37	-	42	-	44	-
IDF	751	98	795	218	816	46	817	73
MS	440	57	442	8	484	14	488	23
PP	-	-	-	-	-	-	-	-
Swakum	418	24	485	70	522	21	410	10
IDF	45	4	42	7	35	1	35	4
MS	373	19	443	62	487	20	375	6
PP	-	-	-	-	-	-	-	-
Tulameen	134	19	200	5	220	33	224	9
ESSF	50	3	59	5	78	-	81	-

Landscape Unit/BEC	Years 1 to 5		Years 6 to 10		Years 11 to 15		Years 16 to 20	
	Eligible	Treated	Eligible	Treated	Eligible	Treated	Eligible	Treated
IDF	1	-	23	-	23	1	23	-
MS	83	16	118	-	119	32	120	9
Upper Nicola	456	74	703	43	765	11	863	48
BG	-	-	-	-	-	-	-	-
ESSF	-	-	-	-	-	-	-	-
IDF	316	63	537	28	529	10	592	47
MS	141	11	166	14	236	0	271	1
PP	-	-	-	-	-	-	-	-
Total Area (ha)	6,215	930	7,229	766	7,553	307	7,472	416

Appendix 4 Uneconomic Rehabilitation - Eligible and Treated Area

Landscape Unit/BEC	Years 1 to 5		Years 6 to 10		Years 11 to 15		Years 16 to 20	
	Eligible	Treated	Eligible	Treated	Eligible	Treated	Eligible	Treated
Coldwater	28	3	45	1	55	3	119	8
CWH	-	-	-	-	-	-	-	-
ESSF	-	-	-	-	-	-	-	-
IDF	20	3	21	-	24	0	26	0
MS	8	-	24	1	31	2	93	8
PP	-	-	-	-	-	-	-	-
Hayes	79	15	114	10	183	-	167	10
ESSF	-	-	-	-	-	-	-	-
IDF	44	14	74	9	75	-	86	9
MS	35	1	39	1	107	-	81	1
PP	-	-	-	-	-	-	-	-
Lower Nicola	18	3	25	16	48	9	56	-
ESSF	-	-	-	-	-	-	-	-
IDF	2	1	14	8	16	-	16	-
MS	15	2	11	7	32	9	40	-
PP	-	-	-	-	-	-	-	-
McNulty	-	-	-	-	-	-	-	-
ESSF	-	-	-	-	-	-	-	-
IDF	-	-	-	-	-	-	-	-
MS	-	-	-	-	-	-	-	-
Otter	14	5	27	-	33	-	44	10
ESSF	-	-	-	-	-	-	-	-
IDF	14	5	20	-	26	-	32	10
MS	-	-	7	-	7	-	12	-
Similkameen	143	42	153	43	255	4	421	0
ESSF	6	-	6	-	6	-	6	-
IDF	98	40	90	12	145	0	151	0
MS	40	2	57	32	105	3	264	-
PP	-	-	-	-	-	-	-	-
Smith-Willis	149	89	154	11	165	-	198	16
ESSF	-	-	-	-	-	-	-	-
IDF	131	89	122	7	133	-	133	5
MS	18	-	32	4	32	-	65	12
PP	-	-	-	-	-	-	-	-
Spius	73	15	133	13	155	2	187	26
ESSF	18	1	74	-	74	2	63	25
IDF	12	4	26	10	37	-	37	-
MH	-	-	-	-	-	-	-	-
MS	43	10	33	2	45	-	87	2
PP	-	-	-	-	-	-	-	-
Summers	148	26	159	37	192	3	203	8
ESSF	-	-	-	-	-	-	-	-
IDF	138	26	146	37	168	3	174	4
MS	10	-	13	-	23	-	29	4
PP	-	-	-	-	-	-	-	-
Swakum	65	30	68	7	78	-	205	2
IDF	42	19	45	-	54	-	54	-
MS	22	11	23	7	24	-	151	2
PP	-	-	-	-	-	-	-	-
Tulameen	-	-	-	-	-	-	-	-
ESSF	-	-	-	-	-	-	-	-

Landscape Unit/BEC	Years 1 to 5		Years 6 to 10		Years 11 to 15		Years 16 to 20	
	Eligible	Treated	Eligible	Treated	Eligible	Treated	Eligible	Treated
IDF	-	-	-	-	-	-	-	-
MS	-	-	-	-	-	-	-	-
Upper Nicola	98	15	45	17	92	20	98	0
BG	-	-	-	-	-	-	-	-
ESSF	-	-	-	-	-	-	-	-
IDF	94	15	41	13	81	20	85	0
MS	4	-	4	4	10	-	13	-
PP	-	-	-	-	-	-	-	-
Total Area (ha)	814	244	923	155	1,256	41	1,698	80

Appendix 5 Managed Stand Fertilization - Eligible and Treated Area

Landscape Unit/BEC	Years 1 to 5		Years 6 to 10		Years 11 to 15		Years 16 to 20	
	Eligible	Treated	Eligible	Treated	Eligible	Treated	Eligible	Treated
Coldwater	205	74	252	32	755	128	1,263	0
CWH	-	-	-	-	-	-	-	-
ESSF	-	-	-	-	0	-	11	-
IDF	125	45	162	31	602	128	885	0
MS	80	29	90	0	153	-	367	-
PP	-	-	-	-	-	-	-	-
Hayes	3,085	861	4,545	625	7,729	382	8,843	465
ESSF	-	-	-	-	-	-	-	-
IDF	1,175	326	1,617	196	2,702	182	2,882	229
MS	1,909	535	2,928	429	5,027	199	5,961	236
PP	-	-	-	-	-	-	-	-
Lower Nicola	642	131	791	70	1,480	156	2,886	126
ESSF	-	-	-	-	-	-	-	-
IDF	10	0	10	3	10	-	27	-
MS	632	131	781	68	1,471	156	2,860	126
PP	-	-	-	-	-	-	-	-
McNulty	335	62	572	186	1,184	79	1,306	86
ESSF	-	-	-	-	-	-	-	-
IDF	12	4	56	-	94	38	94	-
MS	323	58	516	186	1,090	41	1,212	86
Otter	1,806	465	3,247	489	5,181	427	7,315	318
ESSF	-	-	-	-	-	-	1	-
IDF	889	288	1,233	156	2,663	192	3,923	144
MS	917	178	2,013	333	2,518	235	3,391	174
Similkameen	1,390	253	3,825	695	5,748	389	6,123	378
ESSF	-	-	-	-	1	-	1	-
IDF	382	76	1,312	190	1,839	200	1,877	52
MS	1,008	178	2,513	505	3,909	189	4,245	326
PP	-	-	-	-	-	-	-	-
Smith-Willis	1,467	312	3,357	424	4,335	466	5,041	442
ESSF	-	-	-	-	-	-	-	-
IDF	263	22	840	135	1,318	190	1,387	127
MS	1,203	290	2,517	289	3,017	276	3,655	314
PP	-	-	-	-	-	-	-	-
Spius	1,221	387	1,343	322	1,494	42	1,687	114
ESSF	12	-	12	9	12	-	12	-
IDF	303	118	307	70	354	36	422	33
MH	-	-	-	-	-	-	-	-
MS	907	269	1,025	243	1,129	6	1,253	81
PP	-	-	-	-	-	-	-	-
Summers	1,925	387	3,133	563	5,652	732	8,305	403
ESSF	-	-	-	-	-	-	-	-
IDF	836	200	1,627	239	3,393	635	4,144	313
MS	1,089	188	1,505	324	2,259	96	4,161	90
PP	-	-	-	-	-	-	-	-
Swakum	1,036	260	1,566	248	2,004	168	4,701	82
IDF	6	6	12	-	35	15	43	0
MS	1,029	253	1,554	248	1,969	153	4,658	82
PP	-	-	-	-	-	-	-	-
Tulameen	395	87	532	64	741	143	1,030	2
ESSF	-	-	1	1	1	-	1	-

Landscape Unit/BEC	Years 1 to 5		Years 6 to 10		Years 11 to 15		Years 16 to 20	
	Eligible	Treated	Eligible	Treated	Eligible	Treated	Eligible	Treated
IDF	26	0	56	-	64	3	76	-
MS	370	87	476	63	676	140	954	2
Upper Nicola	2,601	813	3,875	687	7,983	831	14,575	336
BG	-	-	-	-	-	-	-	-
ESSF	-	-	-	-	-	-	-	-
IDF	462	239	843	121	3,502	427	5,964	202
MS	2,139	574	3,031	566	4,481	404	8,611	133
PP	-	-	-	-	-	-	-	-
Total Area (ha)	16,108	4,093	27,038	4,405	44,287	3,942	63,076	2,752

Appendix 6 Natural Stand Fertilization - Eligible and Treated Area

Landscape Unit/BEC	Years 1 to 5		Years 6 to 10		Years 11 to 15		Years 16 to 20	
	Eligible	Treated	Eligible	Treated	Eligible	Treated	Eligible	Treated
Coldwater	1,169	292	926	215	881	42	660	92
CWH	55	33	45	10	45	2	35	-
ESSF	138	80	135	27	135	-	110	21
IDF	761	137	632	144	591	38	470	71
MS	214	42	114	33	110	3	45	-
PP	-	-	-	-	-	-	-	-
Hayes	3,826	1,314	2,132	375	1,869	48	1,755	119
ESSF	98	40	76	9	76	21	76	24
IDF	901	195	596	60	505	8	481	3
MS	2,827	1,079	1,461	307	1,288	19	1,198	92
PP	-	-	-	-	-	-	-	-
Lower Nicola	471	181	124	45	124	-	115	13
ESSF	117	46	72	36	72	-	70	9
IDF	62	48	9	4	9	-	1	-
MS	292	86	43	5	43	-	43	4
PP	-	-	-	-	-	-	-	-
McNulty	535	346	491	101	491	116	487	37
ESSF	380	185	336	84	336	90	336	37
IDF	5	1	5	4	5	-	1	-
MS	151	161	150	13	150	25	150	-
Otter	1,492	493	1,235	374	1,195	29	1,114	44
ESSF	97	-	32	28	32	-	32	-
IDF	1,011	379	824	273	806	27	728	44
MS	385	114	379	73	357	3	354	-
Similkameen	2,514	893	1,668	569	1,446	148	1,294	53
ESSF	593	337	316	119	273	-	271	40
IDF	273	28	219	57	210	8	193	-
MS	1,648	528	1,133	393	964	140	830	14
PP	-	-	-	-	-	-	-	-
Smith-Willis	2,000	941	1,599	461	1,539	102	1,050	99
ESSF	700	603	667	82	644	33	212	69
IDF	282	129	168	82	157	6	134	-
MS	1,018	209	765	298	738	63	705	31
PP	-	-	-	-	-	-	-	-
Spius	2,969	855	2,464	740	2,369	83	2,245	223
ESSF	951	315	714	240	713	38	651	53
IDF	488	73	439	205	412	20	384	-
MH	-	-	-	-	-	-	-	-
MS	1,530	467	1,311	295	1,244	24	1,210	170
PP	-	-	-	-	-	-	-	-
Summers	1,809	376	1,238	190	1,180	117	1,106	152
ESSF	69	9	-	-	-	-	-	-
IDF	987	199	710	69	653	76	585	55
MS	753	168	528	121	528	41	521	97
PP	-	-	-	-	-	-	-	-
Swakum	552	222	469	88	414	54	326	12
IDF	133	107	78	7	75	7	59	9
MS	420	115	391	81	338	47	267	3
PP	-	-	-	-	-	-	-	-
Tulameen	1,543	650	1,242	378	1,242	86	1,185	96
ESSF	1,046	523	848	285	848	54	812	44

Landscape Unit/BEC	Years 1 to 5		Years 6 to 10		Years 11 to 15		Years 16 to 20	
	Eligible	Treated	Eligible	Treated	Eligible	Treated	Eligible	Treated
IDF	12	1	12	5	12	-	7	-
MS	485	126	383	88	383	33	367	52
Upper Nicola	4,972	1,138	2,777	611	2,485	303	2,091	186
BG	-	-	-	-	-	-	-	-
ESSF	20	13	8	3	8	-	8	4
IDF	2,915	625	1,852	435	1,585	243	1,206	143
MS	2,037	500	918	173	892	59	877	39
PP	-	-	-	-	-	-	-	-
Total Area (ha)	23,851	7,699	16,366	4,149	15,236	1,129	13,429	1,126

Appendix 7 Enhanced Basic Silviculture - Eligible and Treated Area

	Years 1 to 5		Years 6 to 10		Years 11 to 15		Years 16 to 20	
Landscape Unit/BEC	Eligible	Treated	Eligible	Treated	Eligible	Treated	Eligible	Treated
Coldwater	16,194	385	16,809	927	17,423	1,136	17,776	1,204
CWH	537	19	537	87	595	72	607	60
ESSF	4,736	131	4,733	385	4,864	302	4,953	316
IDF	6,765	184	7,289	341	7,581	588	7,805	621
MS	4,046	51	4,133	114	4,266	160	4,308	200
PP	109	-	117	-	117	14	103	7
Hayes	18,076	985	19,276	848	19,890	973	20,265	1,071
ESSF	2,243	181	2,243	111	2,252	126	2,274	155
IDF	1,595	171	1,786	111	1,965	116	2,184	148
MS	14,238	633	15,247	627	15,673	731	15,808	768
PP	-	-	-	-	-	-	-	-
Lower Nicola	19,495	2,070	20,052	2,042	20,204	1,972	20,598	1,136
ESSF	1,837	172	1,848	129	1,852	148	1,860	89
IDF	8,951	1,035	9,121	1,317	9,274	1,299	9,657	610
MS	8,254	667	8,610	552	8,606	495	8,603	419
PP	452	198	473	45	473	30	478	18
McNulty	15,082	704	15,286	693	15,538	819	16,003	1,192
ESSF	6,483	263	6,467	338	6,467	579	6,585	746
IDF	1,033	70	1,066	67	1,136	76	1,151	90
MS	7,566	371	7,753	289	7,936	164	8,267	356
Otter	12,095	904	12,463	925	12,683	1,020	12,885	874
ESSF	812	44	823	28	846	69	872	20
IDF	7,585	623	7,921	676	8,072	737	8,150	606
MS	3,698	237	3,719	222	3,764	214	3,862	248
Similkameen	26,269	1,879	27,759	2,489	28,818	1,130	29,550	990
ESSF	10,044	591	10,553	1,206	10,731	409	10,855	319
IDF	2,186	254	2,413	167	2,539	99	2,621	204
MS	14,038	1,035	14,793	1,116	15,548	622	16,074	467
PP	-	-	-	-	-	-	-	-
Smith-Willis	18,997	1,247	19,596	804	20,498	1,460	21,575	1,194
ESSF	2,265	19	2,327	68	2,351	204	2,813	358
IDF	5,265	444	5,595	363	6,097	563	6,336	570
MS	11,468	783	11,674	373	12,050	693	12,426	267
PP	-	-	-	-	-	-	-	-
Spius	21,086	2,239	21,705	1,781	22,450	1,898	23,490	1,234
ESSF	10,202	898	10,342	725	10,441	1,091	10,714	620
IDF	3,794	415	4,149	458	4,409	437	4,688	273
MH	105	10	105	35	105	-	105	-
MS	6,985	917	7,110	562	7,495	371	7,983	341
PP	-	-	-	-	-	-	-	-
Summers	10,185	602	10,812	646	11,127	572	11,345	1,350
ESSF	428	53	428	24	432	15	432	47
IDF	5,045	344	5,425	376	5,647	306	5,876	816
MS	4,712	204	4,958	246	5,047	250	5,037	487
PP	-	-	-	-	-	-	-	-
Swakum	11,134	938	11,325	565	11,459	784	11,545	666
IDF	6,460	623	6,701	319	6,845	597	7,010	551
MS	4,644	315	4,593	245	4,583	187	4,480	111
PP	31	-	31	-	31	-	55	4
Tulameen	26,712	2,007	27,485	2,056	28,020	1,586	28,477	1,935
ESSF	17,758	1,235	18,264	1,674	18,543	1,084	18,794	1,586

Landscape Unit/BEC	Years 1 to 5		Years 6 to 10		Years 11 to 15		Years 16 to 20	
	Eligible	Treated	Eligible	Treated	Eligible	Treated	Eligible	Treated
IDF	539	100	568	13	579	25	579	27
MS	8,415	672	8,654	370	8,898	477	9,104	321
Upper Nicola	20,744	1,751	21,799	1,279	22,435	1,416	23,263	2,119
BG	4	-	4	-	4	-	4	-
ESSF	630	109	630	33	636	-	674	70
IDF	11,495	984	12,222	805	12,706	1,005	13,204	1,566
MS	8,520	658	8,831	441	8,977	411	9,233	463
PP	95	-	113	-	113	-	148	20
Total Area (ha)	216,069	15,711	224,369	15,056	230,545	14,766	236,773	14,964