ECOSYSTEM RESTORATION PROGRAM
Rocky Mountain Trench

Forest Stewardship Plan 2012-2017
Companion Document

I certify that the work described herein fulfills the standards expected of a member of the Association of British Columbia Forest Professionals and that I did personally supervise the work.

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October 30th 2011

Rocky Mountain Trench

Ecosystem Restoration Program

Companion Document to Forest Stewardship Plan 2012-2017

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Chapter 1 Introduction

This plan outlines the process, management objectives and proposed Ecosystem Restoration projects for the Rocky Mountain Trench Ecosystem Restoration Program. It should be noted at the start that although co-ordinated by the Ministry of Forests, Lands and Natural Resource Operations out of the Rocky Mountain Resource District, the Rocky Mountain Trench Ecosystem Restoration Program is a coalition of forest and range licensees, naturalist, hunting, angling and environmental clubs, and government agencies united in a goal of restoring the grasslands and historic open forest conditions of the Rocky Mountain Trench.

1.1 Definition of Ecosystem Restoration

The common definition of Ecosystem Restoration can be found at the Society for Ecological Restoration International website http://www.ser.org/

Process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed. Practice of restoring ecosystems (Society for Ecological Restoration International [SERI] 2004).

In the context of the Rocky Mountain Trench, the ecosystem in need of restoration is the treed grassland/ savannah that occupied the valley bottom prior to European settlement and the suppression of the natural fire regime. Fire return studies in the Trench refer to low intensity fires burning through the Douglas fir and ponderosa pine forests ever 5 to 20 years (Gray et al 2004, Gray, Daniels 2005)

1.2 Legal Mandate for Ecosystem Restoration

This plan has to meet the legal requirement of the Forest and Range Practices Act (FRPA), FRPA regulations, orders issued under the Government Action Regulations and the Kootenay Boundary Higher Level Plan Order (KBHLPO). This interaction of legal direction is complicated by the fact that the Kootenay Boundary Higher Level Plan Order was drafted under the legal terms and regulations of the Forest Practices Code of BC Act.

In setting objectives for this program, administrative law requires that some provisions in legislation override provisions in regulations. In this sense the hierarchy of legal precedence is the Kootenay Boundary Higher Level Plan Order (KBLUPO), FRPA and other legislation, regulations issued under FRPA and other Acts, Planning documents (approved FSPs, objectives set under previous Acts) and the Ecosystem Restoration Plan created for any Range Unit.

1.2.1 Kootenay Boundary Higher Level Plan Order

The consensus arrived at in the 1990s can be found contained in the final draft of the Kootenay Boundary Land Use Plan (KBLUP). The document and the implantation strategy can be found at

Despite this the legally enforceable portions of the plan is contained the Kootenay Boundary Higher Level Plan Order declared in January 2003 and amended several times since then. It established Resource Management zones (corresponding to the six of the seven former Forest

Districts in the Kootenay Region - since reduced to 2). Nine Resource Objectives are currently in the Order:

1. Biodiversity emphasis
2. Mature and Old Forest Retention targets (based on Biogeoclimatic Zones)
3. A variation to greenup heights
4. Grizzly Bear Habitat and Connectivity Corridors
5. Management of Consumptive Use streams
6. An Enhanced Resource development zone for Timber
7. Fire Maintained ecosystems (which outlines management in the area for Ecosystem Restoration)
8. Visual quality
9. Social and Economic stability.

The actual plan, backup documents and implementation strategy for the Kootenay Boundary Land Use Plan are used as known information in interpreting the measures and strategies.

1.2.2 Forest and Range Practices Act

The Ecosystem Restoration Program cuts and harvests trees, builds roads, landings and fireguards, and carries out silviculture operations and prescribed burns, under a variety of programs. The following is a series of interpretations of the Act that should be considered in developing or evaluating this plan.

Under section 52 of the Act no trees may be cut or destroyed on Crown land unless authorised by a license granted under the *Forest Act, the Land Act,* or the *Parks Act*. Harvests under major licences granted under the *Forest Act* require a Forest Stewardship Plan. Activities funded by basic government votes or the Forest Investment Account are authorised under this section. Unfortunately the majority of funding sources do not fall into this category and other authority is required.

Under Section 52.1 the Minister may authorise cutting trees for silviculture, stand tending, fuel abatement, forest health or other reasons. Ecosystem Restoration falls into this category. The Rocky Mountain District Manager has requested that the review and comment period of this plan meet the same 60 day review period that a Forest Stewardship Plan would normally meet.

The *Forest and Range Practices Act* is results oriented and has set objectives for timber, water, riparian/ fish habitat, wildlife, cultural heritage resources, soils, biodiversity, forage, community watersheds, recreation, visual quality and resource features. This plan specifies results, strategies and/or measures to address all of these issues. It considers the requirements laid out in Forest Planning and Practices Regulation and meets or exceeds these requirements. By signing this Forest Stewardship Plan the District Manager is approving subsequent prescriptions and actions of the program that follow this plan. If Ministry of Forest Lands and Natural Resource Operations staff do not actually supervise or carry out the operations, then a letter signed by the District Manager to the third party proponent is required to allow operations to proceed as per Section 52.1b) Of the *Forest and Range Practices Act*.

1.2.3 Ungulate Winter Range / Wildlife Management Areas

Two orders issued under the *Government Action Regulation* dated February 10, 2005 (U-4-006 Cranbrook and U-4-008 Invermere) cover the ungulate winter range in the Invermere and Cranbrook Timber Supply Areas. These ungulate winter ranges completely overlap the NDT4-Ecosystem Restoration Area. It is these orders that establish the stocking standards for Open Range and Open Forest stands and it defines these two desired stand conditions by Biogeoclimatic ecosystem types. It is unlikely that exemptions will be required to this order as ecosystem restoration operational goals are consistent with the General Wildlife Measures specified in the order.

Wildlife Management Area # 10 (East Columbia) established under section 4 of the *Wildlife Act also* covers a portion of the NDT4 – Ecosystem Restoration Area. To use the resources on this area will require the consent of the Kootenay Boundary Regional Resource Management Director of the Ministry of Forest Lands and Natural Resource Operations. Consent will be sought by the Ecosystem Restoration Program prior to conducting operations on areas within Wildlife Management Area #10.

1.2.4 Blue Print for Action

The goals of the Ecosystem Restoration Program in the Rocky Mountain Trench (RMT) are taken from the executive of the "Blueprint for Action". The Blue print for Action is the summary document put forward by the RMT Natural Disturbance Type 4 Steering Committee; it is not legal direction but it is known information put forward by citizen groups to interpret the mandate of the Kootenay Boundary Land Use Plan (KBLUP). As it has been agreed to by all Ecosystem Restoration partners it is used in this plan as direction towards a common goal.

Vision:

A restored Trench Landscape functioning at its ecological potential and thereby supporting:

- The native and historical and condition matrix of trees plants and animals
- A sustainable forage resource for wild and domestic grazing ungulates and
- The social economic and cultural needs of stakeholders as they relate to the open range and open forests of the Trench

The Mission:

1. Progressively restore the designated 118,500 hectares of the Trench to an ecologically appropriate fire maintenance condition by 2030, in accordance with tree stocking standards for open range and open forest sites.
2. Maintain the restored 118,500 hectares in an open range or open forest condition in perpetuity.

This document breaks this direction into 20 objectives with measurable targets, design criteria for prescribers and monitoring procedures.

This Ecosystem Restoration program mandated a Steering Committee to oversee progress and find funding for the projects required to carry out the restoration of the grasslands and open forests. The members of this Committee are representatives from:

- The Ministry of Forests and Range
- Parks Canada
- Rocky Mountain Trench Natural Resources Society
- Range Advisory Committee
- Columbia Basin Fish and Wildlife Compensation Program
- Kootenay Livestock Association
- BC Wildlife Federation
- Tembec Industries
- Ministry of Agriculture and Lands
- Ministry of Environment

To carry out the fine details of project development and implementation an Operations Committee was also struck. Members are;

- Ministry of Forests and Range
- Rocky Mountain Trench Natural Resources Society
- Fish and Wildlife Compensation Program (Columbia Basin)
- Galloway Lumber Company Ltd.
- BC Parks Branch
- BC Timber Sales
- Tembec Industries
- Ministry of Agriculture and Lands
- Ministry of Environment
- The Nature Trust of BC
- The Nature Conservancy of Canada

Chapter 2 Process of Plan Development and referral

2.1 Goals of program

The goals of the program is contained the Blueprint for Action and involves progressively treating the 118,500 hectares contained in the NDT4 operating areas until all hectares are in a mosaic of open range and open forest types by the year 2030. The goal by forest type are summarised in table 2.1. The blue print for action also targets 4500 hectares of treatment per year. The target numbers were derived by a GIS algorithm being run on the entire NDT4 area (some 250,000 hectares) in the Rocky Mountain Trench. The details of the algorithm are found in section 3.1 Timber.

Table 2.1 Targets of forest types to be achieved by the Ecosystem Restoration Program by 2030 (source Blueprint for Action 2006)

	Percentage of KBLUP NDT4 Area (%) 250,000 ha			Area in 2030 (ha)
Forest type	As of 1998	As of 2004	As of 2030	
Shrub lands	5	1	5	12,500
Open Range	10	12	17	43,500
Open Forest	Combined as 85%	26	30	75,000
Managed Forest		61	48	119,000

2.2 Prioritisation process and table of results

In order to focus operations to achieve this goal the NDT4 Operations Committee drafted criteria to prioritise 14 Range Units in the Rocky Mountain Trench. These 14 units comprise about 80% of the entire NDT4 area. In a series of 6 meetings over the winter of 2005 to 2006 the multi sector committee came to a consensus over the relative score for each range unit. The end results are tabulated in table 2.2 and 2.3. The remaining twenty one range units should be scored by 2012 and the scores of these 14 range units revisited.

Note also that the prioritisation score is one of many factors in scheduling, funding or inclement weather may delay projects going forward. It is also desirable to spread out projects within the same restoration or range unit so that operations of range or forest licensees are not disturbed and that a steady supply of habitat features (snags, rejuvenated shrubs etc.) are provided across the landscape on a more or less steady stream.

Table 2.2 Prioritisation rating for Ecosystem Restoration Treatments for 14 Restoration Units in Rocky Mountain Trench

Range Unit	Score	Fire Interface		Non Game Sp		Ungulates		Biodiversity		Forage Crunch	Planning	Economical	Regional Priority
		L	C	L	C	L	C	L	C				
Possible Scores	170	5	5	5	5	5	5	5	5	10	20	20	20
E. Columbia Lake	116	3	3	4	4	5	5	4	4	0	10	20	20
TaTa Skook	119	2	2	5	5	3	3	4	4	5	20	20	20
Powerplant	119	2	2	2	2	5	5	4	4	10	20	20	20
Newgate	114	2	2	5	5	3	3	4	4	10	20	20	10
Dutch-Findlay	110	2	2	4	4	3	3	4	4	5	20	20	20
Westside	110	4	4	4	4	3	3	3	3	0	20	20	20
St. Mary's	108	3	3	3	3	3	3	4	4	5	20	20	20
Cherry Tata	106	2	2	4	3	3	3	4	4	5	20	20	20
Waldo-south half	103	4	4	2	2	2	2	3	3	10	20	20	20
Premier Ridge	101	1	1	3	2	5	5	3	3	0	20	20	20
Windermere/ Sinclair	98	4	4	2	2	3	3	3	3	0	20	20	20
Gold-Plumbob	95	1	1	4	4	3	3	3	3	10	20	20	10
Sheep Cr North	93	1	1	3	3	3	3	3	3	5	20	20	20
Peckham's	92	2	2	2	2	5	5	3	3	10	10	10	20
Rampart & Tokay	86	2	2	3	3	3	3	2	2	10	20	20	10
Colvalli	78	1	1	3	3	3	3	2	2	5	20	20	10
Windermere-Fairmont	73	4	4	2	2	3	3	2	2	0	20	10	10
Wild Horse-Lewis Cr	68	1	1	3	3	3	3	3	3	0	10	20	10
Lewis/Wolf	62	2	2	2	2	4	5	2	2	0	10	10	10
Findlay	52	1	1	1	1	1	1	3	3	0	20	10	10
Pickering Hills	88	2	2	3	3	3	3	4	4	10	0	20	20

Table 2.3 Legend to interpret Table 2.2

	Description			
Fire Interface	Based on Spotting Potential	5,4,3,2,1		
Non Game Sp	Based on R & E Species; Excludes Big Horn Sheep			
Game Sp.	Based on % of Class 1 Winter Range for Elk and Big Horn Sheep			
Biodiversity	Based on listed Plant Communities			
Forage crunch	Based on forage shortages for cattle and wildlife	10 =Serious forage shortage	5=Minor forage shortage	0= No Noted Forage shortage
Planning	Based on planning constraints (includes integrating with HCTF, CBFWCP, Range Use Plans)	20 = No planning constraints	10 = Minor planning Constraints	0 = Major Planning Constraints
Economical	Based on economic constraints	20 = No Economic constraints	10 = Minor Economic Constraints	0 = Major Economic Constraints
	Refers to best outcome for cost expended			
Regional Priority	Based on Stakeholder Priorities	20 = High	10 = Medium	0 = Low
	L= Likelihood of unfavourable outcome	**Note that Likelihood and Consequences are multiplied not added to reach a score**		
	C= Consequences of unfavourable outcome			

2.3 Description of default operations

- The past 20 years of range burning and ecosystem restoration operations have created a body of experience that points to several efficiencies and a standard sequence of treatments to show the best results. For planning and budgeting purposes it is important to note them here. Frequent surveys are required to check the effectiveness of the treatment and to feed into a monitoring feedback loop that will be reviewed annually by the operations and steering committees to ensure that the program is constantly improving.

- The efficiencies found are
  - It is easier to control stocking of trees by logging and slashing than by burns alone. Burns hot enough to kill trees can usually burn off the grass and seed bank found in the soil.
  - Logging can increase forage production by as much as three fold but there is another increase of forage by combining logging with a follow-up.
  - The unit cost of treatments, especially prescribed burning decrease with larger blocks. An optimum size for a moderately complex block in the trench is about 300 to 400 hectares. Sixty hectares is about the maximum size that can be lit up by a hand light crew in one day. Blocks over 400 hectares will require two helicopters to complete the burn one day. Aerial Ignition Devices (Rocky Mountain District has three) are preferred as they ignite the understory and not the tree canopy. An aerial drip torch can be used to ignite the canopy but it is a slower treatment and a refuel crew is needed.
  - The North Waldo Pilot Project has shown there is considerable treatment efficiencies in combining the slashing of the block with logging. At 40m3/ha of sawlog and about 10-15m3/h of pulpwood the pilot showed a minor profit of logging and slashing in good log markets and a break even in poor log markets.
  - The Central pasture project has shown that it is cheaper to use feller bunchers and grapple skidders to get wood to roadside than conventional hand felling and piling. The end product is cleaner with less slash to burn and it increases the possibility of selling the wood as pulp, sawlog or hog fuel.
  - From both projects it is preferred to take wood to a landing or roadside for a cleaner block, less smoke management issues, better marketing opportunity and cheaper rehabilitation f roadside areas versus burning widely scattered burn piles. Typically burns follow slashing by two years so typically the Ministry of Forests and Range would have two years to market the semi logged, decked wood.
  - To decrease operational costs and fire guard construction it is best to treat a “logical burn unit” a block that ends in easily defended fire boundaries that respects topography, fence lines, road systems and reserve areas while still allowing good burn operations and the ability to set up convection columns.

The Preferred default treatment regime is:

- Outline a logical burn unit. Year 1
- Carry out the field work for an Ecosystem Restoration prescription, includes a review of conditions and the site by a biologist. Year 1
- Refer the projects January- March Year 2

- In high probability archaeological polygons either avoid damaging the site or hire and archaeologist for a preliminary field reconnaissance April to September Year 2
- It is preferable to log and slash the block simultaneously in summer to late winter year 2.
- Note that slashing of Ponderosa pine stands should occur only after cattle are off site (Ingesting Ponderosa pine needles can cause cattle to abort their foetuses).
- Hand slashing should be late fall prior to snowfall; snow makes heavier work for a crew, and increases high stumps and live limbs.
- Mechanical thinning of stands should be carried out on snow pack especially in archaeologically or ecologically sensitive sites. Note that this phase should include quality plots that carry out tree counts to ensure the correct stand structure is being retained.
- Debris should be left to cure on site two years before the initial broadcast burn in year 4
- A Post treatment plot survey should be carried out to ascertain burn intensity and tree count. Year 4.
- Maintenance burn should be scheduled every ten years south of Skookumchuck and every 15 years north of it. To fine tune the actual timing of routine maintenance surveys should be done every five years.

2.4 Referral to stakeholders

All stakeholders will be sent letters requesting their input to the plan. A list of stakeholders contacted and the timing for their response is summarised in Table 2.1 of the FSP. Letters sent to stakeholders offer a variety of input methodologies including; phone, email, field trips and evening meetings that can be held throughout the district.

The list of stakeholders, range licensees, forest licensees, guide outfitters, trappers, municipalities, community groups, utilities, conservation programs, and recreation organisations are noted in a list kept on file 22000-20/ERP 2012. All comments and input received as a result of the referral process and the Ecosystem Restoration programs' response to these comments are kept on the same file and are also summarised and presented in Appendix II of the FSP.

2.5 Consultation with First Nations

Consultation with First Nations will proceed after other stakeholders have completed their referral comments so that the First Nations are reviewing a final package. The Ecosystem Restoration program will follow government guidelines and processes for these consultations and will allow at least 60 days for First Nations response.

2.6 Structure of this Plan

The Forest Stewardship plan is a plan defined and required for primary forest operations under the *Forest and Range Practices Act.* While it lays out general legal principles to be followed by the Rocky Mountain Trench Ecosystem Restoration Program, the details of how this compliance will be carried is contained in the Forest Stewardship Plan Companion Document also found on the Rocky Mountain Resource District website

under downloads. New blocks are proposed in an annual notification and referral of the Annual Plan, which is just a list of blocks with maps; the actual details of operations are contained in the Companion document. These three planning documents replace the previous Rocky Mountain Trench Ecosystem Restoration Program 5 Year Plans, the latest of which (2011 to 2016) will stay in effect until the Forest Stewardship Plan is signed by the Rocky Mountain District Manager in spring 2012.

Chapter 3 Resources to be Managed

3.1 TIMBER:

O**bjective**:

1. For the treated areas reduce tree density, increase tree size and achieve a tree species composition that falls within the historical range of variability.

    a. Legal Reference: KLUP Management Guidelines for NDT4 ecosystems, Ungulate Winter Range (UWR) order 4-006 and 008, Forest Planning and Practices Regulation (FPPR) section 6 and 41-46.2 Forest and Range Practices Act 149 (1)

    b. Measurable: Open Forest stands shall produce 50% of their volume potential, this half production is estimated to be 70 m3/ha in a 100 year rotation. No merchantable volume is expected from Open Range stands.

    c. Measurable: Open Range stands are to maintain 0-75 stems/ha on site with a target of 20 stems/ha while maintaining largest trees on site emphasizing trees greater than 30cm DBH.

    d. Measurable: Open Forest stands are to maintain 76 to 400 stems/ha on sites with a target of 150 stems/ha while maintaining largest trees on site emphasizing trees greater than 30cm DBH. One third of trees retained are to be from largest diameter class present on site.

    e. Discussion

    i. Larch is to be reserved from cutting as its prevalence has been decreased by historic logging and fire suppression.

    ii. Aspen stands should be reserved from cutting given their wildlife and biodiversity value. Burning should rejuvenate the stand when the stand shows signs of rot or senescence or destructive wildlife impacts.

    iii. Further to the wildlife tree section; as a default all trees over 30cm DBH (40cm Diameter Stump Height (DSH)) should be reserved from cutting so as to recruit more wildlife trees. Cutting the trees over this diameter limit must be rationalised in the Ecosystem Restoration Prescription.

    iv. As a default trees should be retained in clumps rather than uniformly across the landscape. In Open forest areas retain clumps of trees to an average of 150 stems per hectare in clumps of 5 to 20 trees with 10 to 15 clumps per hectare. In Open Range units retain 5 to 10 stems per clump with 5 to 8 clumps per hectare spaced about one tree length apart. This can be varied dependant on site and stand characteristics.

    v. Clumps of retained trees should be concentrated in wetter site series (riparian areas, swales, depressions, toe slope positions) or around clusters of veteran, large diameter or high value wildlife trees.

    vi. The KBLUP Implementation Strategy contains guidelines for fire maintained ecosystems to be considered for management.

        1. Re-entry for mechanical treatment or maintenance burns is targeted at 10% crown closure in Open Range and 40% in Open Forest.

2. Minimum inter tree spacing is set at 1.5 metres.
3. The early and late free growing window is set at 2-5 years after disturbance for all Open Range and Open Forest stands. Note that as per discussion with forest licensees the Ecosystem Restoration Program shall take over management of an NDT4 site of the forest licensee completes a survey showing that Open Forest or Open Range status has been achieved.
4. Reforestation in NDT4 sites shall be by natural regeneration.

vii. As per previous discussion with forest licensees the Ecosystem Restoration program shall manage a plantation established under previous silviculture obligations as managed forest until a commercial crop (sawlog or pulpwood) can be taken off the site. If the site can be classified as Open Range or Open Forest the site shall then be reclassified managed the appropriate standards. The intent is to recapture public investment in the plantation crop. If logistics of prescribed burning or other Ecosystem Restoration treatments require an earlier entry into the stand then the Ecosystem Restoration program will discuss this with the prescribing forest licensee.

viii. Classifying the NDT4 area of the RMT into Managed Forest Open Forest and Open Range was carried defined by the KBLUP Implementation Strategy Task force in 1998. Open Range was defined as forest cover polygons inside the Natural Disturbance Type 4 area with the following characteristics:

1. Open Range, meadow, cultivated, Non Productive Forest types
2. areas with Environmentally Sensitive Areas with classifications of p1 and p 2 (regeneration difficulty)
3. dry warm aspects (135-270 degrees) with a site index <13 and
4. neutral aspects (270-315 degrees or 90-135 degrees or flat land) with site index <13

ix. Open Forest types are defined in the same study as

1. dry warm aspects (135-270 degrees) with site index 13-17
2. neutral aspects (270-315 degrees or 90-135 degrees or flat land) with site index of 13-17
3. cool moist aspects (315-90 degrees) with site index<10
4. any other Ponderosa pine BEC units excluding those in Open Range classifications

x. Managed forests are defined in the same study as

1. dry warm aspects (135-270 degrees) with site index >17
2. neutral aspects (270-315 degree or 90-135 degrees or flat land) with site index >17
3. cool moist aspects (315-90 degrees) with site index >10
4. any other areas within NDT4 area not defined as open range open forest.

xi. Note also that the Ungulate Winter Range Orders 4-006 and 008 defines open range and forest through BEC units. This methodology should be

used as the best methodology for defining open range and open forest and to distinguish both from Managed Forest.

Table 3.1.1 Open Range and Open Forest defined by Biogeoclimatic zone variant and sites series as per Ungulate Winter Range orders UWR-4-006 (Cranbrook) and 008 (Invermere)

Habitat Type	Concept Definition	Intended Field Verified Ecosystem Units
Open Range	Lands ecologically suited to production of bunchgrass and dry land shrub species. Snow accumulations are typically low. (includes existing open range, meadows, cultivated and similar cover classes with </= 10% tree crown closure	PPdh2, 02a, 02b, 01 IDFdm2, un, 02, 03 IDFdm2a, un2, 02 MSdk 02 ICHdm, 02 (&rock talus sites)
Open Forest	Lands ecologically suited for production of large crowned trees in an open forest with bunchgrass and dry land shrub species. Snow accumulations are typically light. (typically </= 40% tree crown closure, multi-storied stand structure and low stocking levels)	PPdh2, 03, 04 IDFdm2, un, 01 warm and neutral sites <1000m (except in LUs I32, I35 and I38) IDFdm2a, un2, 03 with Fd leading MSdk 03 with Fd leading, ICHdw 02 ICHdm, 03 with Fd leading ICHmk1 except Golden 02 ESSFdk 02, ICHwk1, 02, ICHvk1 02

f. Monitoring

i. Effectiveness Monitoring: Over story retention shall be monitored as per Page 2006 Monitoring report (Page 2006)

ii. Routine Monitoring: Over story retention shall be counted after every tree modification treatment (thinning, burn or logging) by one 5.64 metre radius plot per hectare (maximum of 60 plots per treatment unit) coupled with a Basal Area Factor (BAF) 2 prism sweep. Trees are to be tallied by species, total stems/ ha, tree class and diameter to 5 centimetre diameter classes at breast height. Process shall be as per Rocky Mountain Forest District Standard Operating Procedure #8. Store results on Opening files and in RESULTS for later Timber Supply analysis. Changes in Open Range, Open Forest Managed Forest classifications are to noted and tracked on the Range Inventory and fmer map geodatabases for subsequent analysis to see if table 2.1 is being met.

3.2 UNDERSTORY (GRASSES, FORBS SHRUBS):

Objective:

1. Maintain or increase fire adapted native vegetation in treated areas.
2. Maintain or increase palatable grass and shrub production in treated areas.

g. Legal Reference; None specific to grasses or forage production, Ministry of Forests and Range is to maintain the productivity of the forest and range resources of BC as per Ministry of Forests and Range Act preamble.

h. Measurable: Increase the native grass and forb plant cover by 25% and forage production by 10% within ten years of initial burn treatment. Measurement of the increase shall be determined by photo plots taken during routine monitoring that will be calibrated by effectiveness monitoring plots where actual measurements will be taken.

i. Measurable: increase the forage biomass of valuable decreaser (e.g. Saskatoon berry, rose spp., ceanothus, chokecherry) shrubs by 25% cover in treated areas within 5 years. The need for these shrubs should be specified in site specific plans.

j. Discussion

i. Grazing by wild and domestic ungulates should be modified to accommodate Ecosystem Restoration treatments by allowing a fine fuel build up the year before and after a fire. Grazing use should be light the year following a broadcast burn to protect the new growth.

ii. Range licensee to follow a sustainable Range Use Plan as approved by Rocky Mountain Forest District Manager.

iii. Initially, until better inventory data is available, the rough fescue/ Idaho fescue/ blue bunch wheatgrass is to be used as the default community to be increased. The figure of 25% is a program wide goal and it is recognised that this will vary by site.

iv. Wildlife Branch staff are taking action to reduce homesteading ungulates (i.e. elk that do not leave their winter range in the summer months) and reduce overgrazing by wildlife. Extended hunting seasons have been instituted in management Unit X in 2010.

k. Monitoring

i. Effectiveness Monitoring: Under story species composition and forage production shall be monitored as per Pandion 2002 report

ii. Routine Monitoring: Prescribers are to carefully record pre treatment cover of all species, forage or not, in plot notes. Prescribers are to establish photo plots as per routine monitoring procedure to illustrate vegetative changes. Photo plots are to be remeasured, 2 per Logical Burn Unit at 1, 3 and 10 years after treatment; plant identification and cover is to be estimated at each remeasurement.

3.3 **RIPARIAN/ WETLANDS:**

Objective:

1. Maintain and or restore the integrity of riparian and wetland areas in and adjacent to treated areas.

Legal Reference: Forest and Range Practices Act 149 (1) Forest Planning and Practices Regulation 8and 12 (3). Forest Planning and Practices Regulation Sections 47 – 58: 52(2) and 53 specify retention; section 57 identifies need to not damage stream, section 56 no damage to natural drainage pattern. No Lakeshore management zones under Forest and Range Practices Act section 7 and 1812 or FPC

iii. EPR agrees to follow sections 47 to 51, 52 (2), 53-58 of FPPR with enhancements noted below

a. Measurable: All streams, wetlands and lakes shall be identified and classified in the Ecosystem Restoration Prescription for each treatment area as per Forest Practices Code (FPC) Stream Classification Guidebook and Riparian Management Guidebook.

b. Measurable Within each riparian management area, activities shall follow the best management practices contained in the Riparian Management Guidebook namely:

i. Retain all under story shrubs and suppressed and intermediate trees in all Riparian Management Areas.

ii. Retain all dominant and co-dominant trees in all Riparian Reserve Zones, except where provisions of FRPA require harvest. (i.e. safety or road construction)

iii. In general the Ecosystem Restoration program will not harvest or disturb the riparian management zone unless there is an operational, windthrow control, riparian restoration or forest health reason to do so. Rationale to do so shall be specified in the Ecosystem Restoration Prescription

iv. If tree removal is required on any section of the Riparian Management Zones, Ecosystem Restoration Prescription will retain dominant and co-dominant trees but on average each Logical Burn Unit will maintain retention levels as per tables 3.3.1, 3.3.2 and 3.3.3:

v.Maintain natural drainage patterns for classified and nonclassified drainages

c. Discussion:

1) In areas of heavy grazing or recreation pressure, trees or other obstacles may be placed into the riparian management zone to reduce trafficability so as to protect streams whose banks may be negatively impacted by trampling or vehicle traffic
2) All streams are required to have the integrity of the bank maintained during and after operations. As a rule this is understood to be a 5 metre machine free zone from the bank (as measured from the stream's high water mark) or to harvest on a snow pack sufficient to protect the bank.
3) Natural drainage pattern shall be maintained for classified and non classified drainages.

4) The intent of variable retention is to retain trees where they are most required. Streams with marginal fish habitat or no consumptive water use habitat could have lower rates of retention than areas of better fish or wildlife habitat potential. In general highest rates of retention should occur where:
    (1) Stream is in a Community or Consumptive Use Watershed.
    (2) The stream is known to be a temperature sensitive stream (none in Rocky Mountain Forest District)
    (3) The stream is designated to be fishery sensitive (as of 2006 only the Palliser River in the Rocky Mountain Forest District is so designated)
    (4) Large organic debris is critical to the functioning of the stream
    (5) The stream is, or is directly tributary, to a stream of high fish value
    (6) The control of water or stream bank protection is a priority on the stream (e.g. an S5 or S6 with a 30% gradient flowing directly into fish habitat where trees and are critical to stream bank stability)
5) Non Classified Drainages are water bodies that do not fit the legal definition of streams but may still pose water control problems. Objectives here are to maintain stream bank stability similar to classifiable streams and to retain all shrubs and co-dominant trees within 10 metres of the stream bank.
6) Stream crossings should be at designated crossings. All S1 to S4 crossings should be crossed by a bottomless structure so that no in stream work is required and disruption to fish habitat and water quality is minimal. This will also negate the need for an in stream work permit from Water Branch. In non fish bearing streams the crossings should be by box culvert, pipe culvert or clean log bundles with appropriate sedimentation control. Removal of structures should occur before the first spring freshet following the harvest and the deconstruction should remove all likely sediment sources from the natural water course and restore the original bank and channel configuration

d. Monitoring protocol

i. Effectiveness Monitoring; monitor riparian integrity as per Pandion 2002 report or the Forest and Range Evaluation process.

ii. Routine Monitoring: Riparian tree and shrub retention shall be evaluated during all harvest, slashing and burning treatments inspections. Photo plots will be re-examined for riparian retention and deterioration during subsequent visits.

Table 3.3.1 Definition and recommended management strategies for riparian areas by stream class

Riparian Class	Size limits for riparian area in this class (width in metres)	Relevant Fish Community watershed status	Riparian Reserve Zone width (m)	Riparian Management Zone width (m)	Retention target for dominant- co-dominant trees in RMZ (% of pre treatment basal area)
S1A	> 100 m	Fish bearing, CW	0	100	50 windfirm overall 20
S1A	>20 < 100	Fish bearing, CW	50	20	50 windfirm overall 20
S2	>5 < 20m	Fish bearing, CW	30	20	50 of windfirm overall 20
S3	>1.5 <5 m	Fish bearing, CW	20	20	50 of windfirm overall 20
S4	< 1.5 m	Fish bearing, CW	0	30	25 overall (10m reserve preferred)
S5	> 3 m	Non fish	0	30	25 of windfirm overall 10
S6	< 3 m	Non Fish	0	20	5 of windfirm overall 10

Note that riparian classes and widths of riparian reserves and management zones for all lakes, streams and wetlands are set by the Forest Planning and Practices Regulation.

Table 3.3.2 Definition and recommended management strategies for riparian areas by wetland class

Riparian Class	Size limits for riparian area in this class (hectares)	Relevant Biogeoclimatic zone	Riparian Reserve Zone width (m)	Riparian Management Zone width (m)	Retention target for dominant- co-dominant trees in RMZ (% of pre treatment basal area)
W1	> 5 ha	IDFdm, MS	10	40	40 wind firm overall 10
W2	> 1 ha	PP	10	20	70 wind firm overall 25
W3	<5 >1 ha	IDFdm, MS	0	30	40 wind firm overall 10
W4	< .25 > 1 ha	PP	0	30	70 wind firm overall 25
W5	A wetland complex of over 5 ha size	All	10	40	70 wind firm overall 25

Table 3.3.3 Definition and recommended management strategies for riparian areas by lake class

Riparian Class	Size limits for riparian area in this class (hectares)	Relevant Biogeoclimatic zone	Riparian Reserve Zone width (m)	Riparian Management Zone width (m)	Retention target for dominant- co-dominant trees in RMZ (% of pre treatment basal area)
L1A	>1000 ha	All	0		25 overall
L1 B	5 to 1000 ha	All	10		25 overall
L2	>1<5 ha	PP	10	20	70 wind firm overall 25
L3	>1<5 ha	IDFdm, MS	0	30	40 wind firm overall 10
L4A	>.25<1 ha	PP	0	30	70 wind firm overall 25
L4B	>.5<1 ha	CDF, CWH dry	0	30	40 wind firm overall 10

3.4 FISHERY SENSITIVEWATERSHED:

Objective:

1. Do not impair the quality of fishery sensitive watersheds

   a. Legal Reference: The Objectives set by Government for Fishery Sensitive watershed are as follows (Section 8.1 of Forest Planning and Practices Regulation). There are no objectives for Fishery Sensitive watersheds in the Kootenay Boundary Land Use Plan (KBLUP).

   b. Measurable; None no fishery sensitive areas in NDT4 area.

   c. Discussion

   a. The rivers listed in schedule 2 of FPPR as being both Fishery Sensitive and in Rocky Mountain District are Nicole/ Upper Lussier, Coyote Creek, Thunder, Albert and Palliser and Bradford River. All of these rivers are outside the Ecosystem Restoration FDU so no result or strategy will be prepared for them.

3.3 COMMUNITY WATERSHEDS:

Objective:

1. Do not impair the quality of domestic or irrigation water supplies

a. Legal Reference: Forest and Range Practices Act 149 (1) Forest Planning and Practices Regulation 8 .2 and 59 -63 speaks to community watersheds. Objective 6 Kootenay Boundary Land Use Plan (KBLUP) also establishes consumptive use stream. No water quality objectives have been set for Rocky Mountain Trench

b. Measurable; Ecosystem Restoration Program shall abide by watershed assessments created for any consumptive use or community watershed in the NDT4 area.

c. Measurable: As per section 59, 60 and 61 of FPPR Ecosystem Restoration program will control sediment through out project areas by grass seeding exposed mineral soil within one growing season of disturbance, carry out no soil disturbance works within 100 metres upstream of all consumptive water intakes and take care to damage no water works infrastructure.

d. Discussion

iii. Impact to watersheds typically come as a result of riparian reserve harvest and increased stream instability, input of sediment or increases in harvest causing a change in the peak flow (FPC 1995c). Ecosystem Restoration Program operations should not be creating a risk to watersheds as:

1. As per the riparian section of the Objectives matrix the Ecosystem Restoration Program shall be maintaining a enhanced riparian buffers in these watersheds. The Ecosystem Restoration Program shall be exposing mineral soil for fireguards with a minimum addition of roads for small scale harvesting. As per the Invasive Plants section of the Objectives Matrix Ecosystem Restoration Program is committed to rapid revegetation of denuded sites. The avoidance of sediment near water intakes has already been made and will be adhered to.
2. The Ecosystem Restoration Program does not produce clearcuts but a select harvest of trees. The select harvests will increase snow catch and subsequent spring runoff. The shading of the selectively harvested stand will slow the spring runoff and decrease the risk of creating an earlier higher peak in spring run off.

iv. Note that the elevation contour which 60% of the land area of a drainage is above, is called the H 60 line. When the elevation of melting snow climbs up the hill and the snow line reaches the H60 elevation, peak spring flow occurs. Tree removals below the H60 line have less impact to peak flow than tree removals above this line. Most of the consumptive streams in question originate in the higher portions

of the Rocky and Purcell Mountains. Most of the Ecosystem Restoration operating area is well below the H60 for these creeks and impact to peak flows should be minimal (Gluns 2001).

v. The removal of trees from these watersheds is will reduce evapotranspiration and this put more water in the groundwater (Hewlett 1982) system. This will make more water available for recharging wells, streams and wetlands. This would have a beneficial effect for water users and the red and blue listed species dependant ion riparian areas.

e. Monitoring: Maintain referral and notification documentation on the 5 year plan file and opening file. The area around water intakes is to be checked during operations and the riparian monitoring process followed.

Table 3.3.1 List of Community Watersheds in Ecosystem Restoration FDU

Watershed	Community	Range Unit
Mathew-Mark	Kimberley	St Mary's/ Cherry Tata
Miller	Grasmere	Grasmere
Reserve	Tobacco Plains	Grasmere
Joseph-Gold	Cranbrook	Alkali Lake, Upper Joseph Creek
Goldie	Invermere	Westside

3.3 CONSUMPTIVE USE WATERSHEDS:

Objective:

2. Do not impair the quality of domestic or irrigation water supplies

a. Legal Reference: Objective 6 Kootenay Boundary Land Use Plan (KBLUP) also establishes consumptive use stream. No water quality objectives have been set for Rocky Mountain Trench

b. Measurable; Ecosystem Restoration Program shall abide by watershed assessments created for any consumptive use or community watershed in the NDT4 area.

c. Measurable: As per section 59, 60 and 61 of FPPR Ecosystem Restoration program will control sediment through out project areas by grass seeding exposed mineral soil within one growing season of disturbance, carry out no soil disturbance works within 100 metres upstream of all consumptive water intakes and take care to damage no water works infrastructure.

d. Measureable The Ecosystem Restoration Program shall query government databases prior to treatment of site to see if there are down stream domestic water intakes as per map 6.1.

1) **Discussion**
   a) The ER Program shall increase riparian retention in consumptive use watershed and extend the streamside management zone to 30 metres from the high water mark of the stream or the top of an inner gorge when a stream meets the criteria set out in section 6 of the Kamloops Boundary Higher Level Plan Order. Site specific recommendations to maintain soil and stream bank stability will be specified within the Ecosystem Restoration prescription for any block that occurs upstream of a water intake.
   b) Nearly all Ecosystem Restoration plan areas are downstream of the water intake for the consumptive streams shown on KBLUP map 6.1
   c) To comply with the Domestic watershed objective of KBLUP, all Ecosystem Restoration prescriptions shall be reviewed for the presence of down stream domestic water Points of Diversion (POD) ARCVIEW map layer available from the Land and Resource Data Warehouse through MAPVIEW. There will no soil disturbance within 100 metres upstream of a point of diversion. The Ecosystem Restoration program will not treat into a 30 metre wide RMA upstream of a domestic water POD unless hydrologic opinion is sought. Referrals will be sent to water licensees, during the Annual Plan referral process, if a classifiable stream connects the POD to the Ecosystem Restoration treatment area.

e. Monitoring: Maintain referral and notification documentation on the 5 year plan file and opening file. The area around water intakes is to be checked during operations and the riparian monitoring process followed.

3.5 **OLD GROWTH MANAGEMENT AREAS (OGMA):**

Objective:

1. Maintain or recruit old growth characteristics on all treatment areas-

a. Legal Reference: Forest and Range Practices Act 149 (1) Forest Planning and Practices Regulation section 9 and 64-65. KBLUP Management Guidelines for NDT4 systems (Implementation Strategy). Objective 1 (Biodiversity Emphasis Option), 2 (Mature and Old forest), 4 (Greenup), 5 (Grizzly Bear Habitat and Connectivity Corridors) 8 (Fire Maintained Ecosystems) KBLUP. See variances for KBLUP objectives 2, 4 and 5

b. Measurable Ecosystem Restoration Program shall maintain the OGMAs as laid out by ILMB in a map product produced in 2006, and will thin and burn them only to maintain function and stand health.

c. Description

i. Objective 1 of KBLUP establishes the Biodiversity Emphasis options of all the various landscape units in the Cranbrook and Invermere Timber Supply Areas. They will of course apply to the Ecosystem Restoration program as well as all other primary forest operations.

ii. Similarly Objective 4 applies to Ecosystem Restoration operations. As the Ecosystem Restoration program maintains a forest on site the green up height requirement should be a limiting factor in Ecosystem Restoration operations.

iii. The Ecosystem Restoration program shall consult map 5.2 showing movement corridors in laying out retention strategies at the landscape and Range Unit level. These movement corridors shall not consist of unbroken dense forest canopy as intimated by the implementation strategy but denser concentrations of retained forests in Managed forest polygons, wildlife tree patches, draws, gulleys or imbedded retention areas so as to facilitate wildlife movement at a landscape level. Large unbroken closed forest in the NDT4 area would contradict direction given by Objective 8 of KBLUP Fire Maintained Ecosystems.

iv. Legally Old growth Management Areas are aspatial in the Rocky Mountain Trench NDT4 area. The spatial OGMAs provided by Integrated Land Management Bureau (ILMB) shall be respected as OGMA. Large trees will not be taken from them; any actions within their boundaries shall concentrate on thinning from below so as to maintain the function and health of the OGMA. In these cases:

1. All trees over 20cm diameter at stump height shall be reserved from cutting.
2. Piling of debris shall be more 10 metres or half a tree length from any tree over 30 centimetre at breast height or any high value wildlife tree.

3. Piling of debris shall be by hand or by machine on adequate snow cover or frozen soil conditions. The intent to prevent root damage.
4. Any machine use in an OGMA shall be on adequate snow cover or frozen soil conditions.
5. Excess fuel build up shall be screefed away from high value dead wildlife trees and tree over 50 centimetre diameter at breast height.

vi. As per Objective 2 of the KBLUP From a current level of 26% of the stands in the NDT4 being > 100 years old and only 1% > 250 years old the Ecosystem Restoration area shall progress, over 100 years, to ;

1. 17% >100 years old and 13%>250 years old in low emphasis Landscape Units and
2. 34%>100 years old and 13% > 250 years old in intermediate Landscape Units.

v.As stands are spaced and thinned the average stand age will increase and speed the achievement of Objective listed in measurables above. The retention of larger trees in Ecosystem Restoration projects is expected to meet old growth requirements and characteristics for the Trench. Ecosystem Restoration treatment will create a healthier stand to be maintained in the long term.

vi. As the retention strategy called for in the understory section of this plan is designed to mimic the natural pattern of forests the intent of the Movement Corridor Objective 5 under KBLUP should be met without a specific result or strategy. Retaining extra trees would contradict Objectives 8 Fire maintained Ecosystems.

vii. Ponderosa pine stems should be evaluated for their value as old growth using methodology pioneered in Colorado see:

1. Huckaby, Laurie Stroh; Kaufmann, Merrill R.; Fornwalt, Paula J.; Stoker, Jason M.; and Dennis, Chuck. 2003. **Field guide to old ponderosa pines in the Colorado Front Range.** Gen. Tech. Rep. RMRS-GTR-109. and
2. Huckaby, Laurie Stroh; Kaufmann, Merrill R.; Fornwalt, Paula J.; Stoker, Jason M.; and Dennis, Chuck. 2003a. **Identification and ecology of old ponderosa pine trees in the Colorado Front Range.** Gen. Tech. Rep. RMRS-GTR-110.

d. Monitoring:. The Ecosystem Restoration program shall record treatment of OGMAs in prescriptions and in fmer database for fuller analysis at landscape level.

3.6 PATCH SIZE DISTRIBUTION:

Objective:

1. Burn and treatment areas should approximate historic patch size distributions.

   a. **Legal Reference**: Forest and Range Practices Act 149 (1) Forest Planning and Practices Regulation section 9 and 64-65.; Objectives 1 (Biodiversity Emphasis) Objective 4 (Green up) KBLUP Management Guidelines for NDT4 Systems references Forest Practices Code Biodiversity guidebook targets.
   b. **Measurable**: The Ecosystem Restoration program is following the direction of the KBLUP NDT4 guidelines and the Ungulate Winter Range orders 4-006 (Cranbrook) and 4-008 (Invermere). The stand conditions for open range and open forest are designed to mimic the naturally occurring forest and thus the Ecosystem Restoration program complies with the Forest and Range Practices Act as delineated in section 62 (2) (b) of the Forest and Range Practices Regulation.
   c. **Discussion**:
      1) The Ecosystem Restoration program is following the direction of the KBLUP-IS fire maintained ecosystem guidelines and Ungulate Winter Range Orders 4-006 (Cranbrook) and 4-008 (Invermere). The stand conditions for open range and open forest are designed to mimic the naturally occurring forest and thus the Ecosystem Restoration program complies with the Forest and Range Practices Act as delineated in section 9 of the Forest Planning and Practices Regulation. The rationale follows.

      Table 3.7.1 Recommended Patch size distribution for NDT4 forests from the Biodiversity Guidebook (FPC 1995a)

Patch size (ha)	% Forest area within landscape unit
<40	30–40
40–80	30–40
80–250	20–30

      2) Recent publications indicate that the NDT4 distribution listed in the Biodiversity guidebook (FPC 1995a) as in table 3.7.1 above may be simplistic (Gray 2005) and that the Rocky Mountain Trench may be a complex of mixed and low intensity fire regimes (RW Gray et al 2008; Blackwell et al, 2003). Further stand replacement patches may be much smaller than suggested by the biodiversity guidebook (Hessburg, et al 2007) and the replacement areas being on the order of 1 to 5 hectares in the Ponderosa Pine forests in the Black Hills of Dakota. Similarly canopy gaps showing very small areas of stand initiating events of well under 1 hectare in Ponderosa pine and mixed forest types in Oregon, California

and Arizona studies (as reported in Gray et al 2003). Overall it is almost impossible to determine how large the actual fires were as there was very stand initiating burns to show up on forest cover mapping and linking separate fire ring data is speculative; fire scarred trees twenty metres apart may not both be marked by the same fire (Gray et al 2004). The Ecosystem Restoration Program will operate within logical burn units of 60 to 700 hectares in; dependant on public safety and operational constraints and maintain a canopy meeting open forest and open range stocking characteristics as defined by the Cranbrook and Invermere Ungulate Winter Range orders.

3) Low intensity fires have a fire return period under 30 years (Blackwell et al, 2003, Daniels et al 2011) where 90% of the canopy and about 70% of the basal area is retained after the fire (Gray and Blackwell 2005). The fires can often be large (Daniels et al 2011) but frequent copses and skips are a feature of natural fires and these skip features tend to be small (Gray et al, 2004, Gray and Daniels, 2007, Stuart-Smith and Hendry, 1988). Wildlife tree patches shall be retained to simulate skips as per section 3.8 of this plan.

4) The stand reconstruction surveys carried out in the district on NDT4 stands, as per table 3.7.2 generally show that the historic pre-ingrowth stands are close to those called for in the Cranbrook and Invermere Ungulate Winter Range Orders (Gray 2001, Gray et al 2004, Gray, Nesbitt, Daniels 2008). The understory/ ingrowth trees in these stands tend to be recruited in pulses after a fire event. The Ecosystem Restoration program will aim to create stands stocked to the Ungulate Winter Range Orders. Maintenance of these stands is necessary as the action of prescribed burning with reinitiate the ingrowth and ingress problem that this program was established to reduce.

5) The connectivity portion of KBHLPO objective 5 is addressed via the OGMA and mature deployment process conducted by ILMB. The Ecosystem Restoration Program shall, in its operations maintain the integrity of OGMA's and mature areas as laid out by the Integrated Land Management Bureau in a map product produced in 2006 and stored in the data warehouse, (WHSE_LAND_USE_PLANNING.RMP_OGMA_NON_LEGAL_CURRENT_SVW) and in doing so, will satisfy Objective 5 of the KBHLPO.

6) In addition, he Ecosystem Restoration program shall consult KBHLPO Map 5.2 showing connectivity corridors when retention strategies at the landscape and range unit level. These connectivity corridors shall not consist of unbroken dense forest canopy but, as envisioned by the Kootenay Boundary Land Use Plan Implementation Strategy, will consist of linking large areas of Open Range and Open Forest to facilitate the movement of grassland species. Retention patches of denser forests in managed forest polygons, wildlife tree patches, and draws or gulleys will

be present and may facilitate wildlife movement for dense forest species at a landscape level. Large unbroken closed forest in the NDT4 area would contradict direction given by Objective 8 of KBLUP Fire Maintained Ecosystems. Retention and wildlife tree patches will be tracked in a mapped database by the Ecosystem Restoration program

d. Monitoring: Patch size and retention shall be recorded in the fmer database in order to calculate the patch sized distribution at landscape level

Table 3.7 Summary of recent publications showing actual stand structure changes in Interior Douglas and Ponderosa Pine Biogeoclimatic sub zones in the Rocky Mountain Trench

Publication	Biogeoclimatic subzone	Location of study	Fire Return period (years)	Stand Density change	Stand structure comments
Gray 2001	IDFdm2 1120 to 1260m elevation	Stoddart Creek	10-46 ave 32	Up to 1670% increases (22 to 1700st/ha	Light frequent fires historically; no char in forest floor. Evidence that trees infiltrated from upslope to down. Large increase in Juniper 19th century. Pulses of FDi ingrowth following fires from 1900 to 1950
Gray et al 2003	IDF to MSdk	Lone Peak	1-43 ave 13.9	More increase at lower elevation	Regen pulse of FDi from 1900s at lower elevation, species change from Lw, Py Fdi to Fdi Py. Older trees at higher elevation more diverse species; down hill encroachment
Gray et al 2003	IDF to MSdk	East side Columbia lake Warspite to Geary Creeks	2-44 ave 13.9	Increase from historic marked at low elevation	Fdi at all elevations but more Pli at Msdk; cohorts of ingrowth from 1800 to 1850. Most fires seem started by midslope lightning fires, appears little influence from First Nations
Gray, Riccius, Wong 2004	IDFdm2	Lewis Ridge Isadore Canyon	3-52 ave 18.9 1-29 ave 14.1	Density increase 540%	Pulses of trees, switch from Lw and Py to Fd, little regeneration since 1920's most regeneration 1800s, no fir for 104 to 115 years
Gray and Daniels 2007	Lower MSdk	Lower Gold and Joseph Creeks	3-93 ave 17.2 3-69 ave 20	Well spaced to multi layer	Change From well spaced Lw to multilayered stand with significant Pl component. Flatter areas had larger disturbance 100ha, steeper smaller patches few hectares. Moderate severity burns
Gray, Nesbitt, Daniels 2008	IDFdm2	McLeary Park Cranbrook	3-23 ave. 7.7	25 trees to 3500	Historic forest almost all Lw some Py FDI, now 95% Fdi. Pulses of regeneration from

				thickets of 10,000	1800's. No fire since 1938. Light severity frequent fires
Da Silva 2010	Idfdm2 MSdk	Joseph Creek	4-91 ave 14-27 1-148 ave 7-57	Cohorts recruitment	Mixed severity fires in MSdk; continuum, roughly 97 years since last fire.

3.7 WILDLIFE TREES (WT):

Objective:

1. Increase or maintain the density and sizes of wildlife trees in treated areas.

a. Legal Direction: Forest and Range Practices Act 149 (1) and Forest Planning and Practices Regulation section 9.1 and 66. Section 66 requires to maintain 7% stand in Wildlife Tree Patch (WTP).

b. Measurable: Wildlife tree patch retention shall be as per table 3.9, to be met at Restoration Unit level.

c. Measurable: Patches of snags and live trees will be in patches of .1 to 1.0 hectares rather than even distribution so as to proximate the natural occurrence of skips after a wildfire and located so as to approximate the areas likely to be unburnt after a light intensity fire.

d. Discussion

i. The overstory retention of the Ecosystem Restoration program meets the retention of live green trees required by Section 66 of Forest Planning and Practices Regulation Ecosystem Restoration should meet the intent of Wildlife Tree retention as the trees reserved in Open Forests will be maintained and added to over the 100 year rotation of the stand to maintain 76 to 400stems per hectare. As well trees in Open Range Treatment Units will never be harvested. These trees must be live trees; the issue for Ecosystem Restoration to meet is to provide and recruit the snags required for cavity nesters and other wildlife

ii. Ecosystem Restoration program will set aside untreated areas or multi layered stand for site specific tied to a specific species or habitat need. There will be reserves set aside at the landscape level to reflect untreatable ground, Flammulated owl habitat, goshawk nests and riparian areas, but this figure is not likely to average out at 7% at the stand level , but will be calculated at the Restoration Unit level. Some stands may require thinning from beneath to protect the entire stand from burning in a prescribed fire. This will be rationalised at stand level.

e. The retention rates in table 3.9 are to be met at the Range Unit level. The Ecosystem Restoration program shall maintain a Wildlife tree (WT) and WTP tracking layer as a feature class in the fmer database.

f. Retention strategies

i. The actual retention of snags and wildlife trees shall be documented by the Ecosystem Restoration program with landscape and stand level set asides recorded and mapped during prescription phase. Post burn structure is to be recorded after a broadcast burn is completed. A shortage of retention in one treatment due to windthrow or beetles shall be addressed by heavier retentions in remaining forests.

ii. All prescribers and contractors are required to note and work around high value wildlife trees and protect them with a no work zone.

iii. All Ecosystem Restoration prescriptions shall survey or inspect the treatment area prior to treatment to identify and ribbon out patches and trees with features important to cavity nesters. (see iv below) These features shall be recorded, the patches GPSd and protection or recruitment strategies specified in the prescription. Areas of good WTs or relatively dense snags should be prescribed as a WTP and ribboned out and protected during mechanical treatments. Location and boundaries should consider long term retention of the WTP with boundaries that can be easily defended during maintenance burns. The best location for a fire proof WTP would be 100 metres from south end of a burn, on the wet side of a burn (winds are generally prevailing from south an west) or on dry light fuel ridges or guarded by riparian areas or road systems. High value trees are to be retained wherever they are found, and protection strategies specified.

iv. Use tree species recommendations in Cooper et al 2004 when targeting WT retention or recruitment towards any Species at risk. Treatment should provide for future WT recruitment by leaving patches of the largest diameter stems available in the stand. The general high value trees to retain are:

i. Large diameter decay class 3-5 wildlife trees

ii. Trees with the presence of cavities, dead trees with broken tops, evidence of internal decay and largest available diameter classes (Machmer 2002)

iii. Reserve all class 1 to 5 wildlife trees with pileated woodpecker excavated holes.

iv. Large diameter thick bark Douglas-fir with thin crowned poor form “wolfy” trees with large branches and the bright yellow lichen *Letharia vulpina* growing on their stems and branches.

v. Smaller diameter Douglas-fir and Ponderosa pine should be conserved for growth into future WTs in all areas.

vi. Large senescent or dead top Ponderosa Pine should be reserved from harvest or cutting. With thick bark, they are relatively resistant to fire and can provide wildlife habitat for decades. Specifically protect trees >30cm DBH with flat red bark. See OGMA section for references.

g. Burning Considerations

i. Large diameter decay class 3-5 wildlife trees that lack intact bark on the lower portions of the bole are particularly susceptible to prescribed burning. These wildlife trees, especially those with existing cavities, should be protected during burning by raking duff and flammables away from the base of the tree, leaving a protective green curtain of younger stems to absorb the heat or by guarding the WTP.

ii. Burn boss can avoid a heavier burn in rich areas of WTs by dropping less Aerial Ignition Device (AID) balls near the WTP, back burning or black lining the boundary or reducing fuel adjacent to the WTP before light up by screefing light fuels away from the base.

iii. As a last resort (due to high treatment costs and access issues), foaming or wetting down high-value individual WTs might protect these ecological

assets. Wrapping the tree in metal foil does not greatly increase the wildlife tree's ability to survive a prescribed burn (Gray, 2004, Gray, Blackwell, 2002)

h. Recruitment Strategies

i. In a shortage of snags following harvest or slashing about 5 to10 stems/ha of a merchantable size should be planned to be converted to snags by piling debris against them, ringing or damaging the tree or igniting them during the prescribed burn. Inoculating the trees with a fungus is a more sure way of producing a high value wildlife tree (Manning, 2008). Snags produced by inoculation take longer to form but may stand longer and will be planned for in specific areas where a need for them is identified.

ii. It is important to plan for the recruitment of snags by estimating the lifespan of wildlife trees Evidence from American reports suggests tree can rot from standing dead to decay stage 5 (equivalent of Canadian decay class 3 to 9) using following formulas (Cline 1980 as reported in Everett et al 1988). Report was based on retrospective study of 81 fires in Oregon state dry forest belt. The following formulas should be used to predict a snag shortfall on a restoration unit and a plan evolved to bridge "gaps' in the spacing or timing of snags in the restoration unit.

i. Douglas-fir years to decay state = (-2.052+ 2.2431* (decay state)) squared

ii. Ponderosa pine is Years to decay class = (-0.988 + 1.9325 * (decay state)) squared

h. Monitoring protocol

iii. Effectiveness Monitoring: Wildlife tree, species composition, diameter and density shall be monitored as per the Pandion 2002 report. The longevity and deterioration rates of snags should also be investigated.

iv. Routine Monitoring: Wildlife trees and snags are to be noted in all post burn and mechanical treatment surveys. Wildlife trees and WTP set asides are to be tracked in prescriptions and as an ARCVIEW mapping layer. Layer and database are defined in fmer Version 3.2 geodatabase.

Table 3.9 Retention for Wildlife Tree patches by Landscape Unit and Biogeoclimatic sub-zone in the Ecosystem Restoration Forest Development Unit

Landscape Unit Number	Landscape Unit Name	Range Units	Biogeoclimatic zone Variant	Wildlife Tree Patch Retention rate (%)
C02	Perry Moyie	Perry, Moyie	IDFdm2 MSdk	7.0 7.7
C10	Bloom Caven	Upper Gold Plumbob	IDFdm2 MSdk	8.3 8.6
C13	Galton Range	Wigwam, E	IDFdm2	3.8

		Grasmere	MSdk	1.5
C25	Sand Creek	Burton and Rosen Lake	IDFdm2 IDFdm2a MSdk	2.4 0.6 0
C29	Wildhorse Steeples	Wildhorse-Lewis, Powerplant	IDFdm2 MSdk	3.0 2.9
C30	Cranbrook	Alkali, Cranbrook-Fort Steele, Rampart-Mayook, Peavine, Patton, Joseph	IDFdm2 MSdk PPdh2	7.7 6.1 5.5
C32	St Mary's Prairie	Cherry Tata, St Mary's Prairie	IDFdm2 MSdk PPdh2	7.7 6.5 8.4
C33	Wasa Picture Valley	Lewis-Wolf, Wildhorse-Lewis, Peckham's Lake, Powerplant	IDFdm2 PPdh2	5.9 4.8
C34	Jaffray- Baynes Lake	Colvalli North, Waldo, Pickering Hills, Burton Lake	IDFdm2 IDFdm2a MSdk PPdh2	8.0 7.4 5.2 6.9
C35	Tobacco Plains	West Grasmere	IDFdm2 PPdh2	6.8 7.5
C36	Mayook-Wardner	Rocky Chipka, Tokay Hills, Haha Creek, Baker	IDFdm2 MSdk PPdh2	6.8 6.6 5.7
C37	Linklater-Englishman	East Gold Plumbob, Newgate	IDFdm2 MSdk PPdh2	7.4 7.5 6.9
I03	Skookumchuck/ Torrent	Tata-Skookumchuck, Torrent	IDFdm2 MSdk PPdh2	6.5 3.1 4.8
I04	Premier/ Diorite	Sheep Creek North, Watson, Wolf-Sheep	IDFdm2 MSdk PPdh2	7.1 6.2 6.5
I11	Kootenay	East Columbia Lake	IDFdm2 MSdk	2.1 7.6
I12	Doctor/ Fir	Dutch- Findlay, Findlay Basin	IDFdm2 IDFxk	9.1 9.1

			MSdk	6.7
I13	East Columbia	East Columbia Lake, Windermere-Fairmont	IDFdm2 IDFxk MSdk	2.7 3.1 4.1
I18	Invermere	Toby-Horsethief, Westside	IDFdm2 IDFxk MSdk	7.8 5.1 7.7
I25	Shuswap/ Windermere	Windermere-Sinclair	IDFdm2 IDFxk MSdk	0.1 1.2 3.9
I29	Steamboat	Frances Creek	IDFdm2 IDFxk MSdk	9.0 2.1 8.0
I30	Kindersley Macauley	Luxor	IDFdm2 IDFxk	3.9 2.1

3.09 COARSE WOODY DEBRIS (CWD):

Objective:

1) Maintain a naturally occurring level of large sized (>30cm diameter) CWD in treated areas.
   a) **Legal Reference**: Forest and Range Practices Act 149 (1) and Forest Planning and Practices Regulation section 9.1 an 68. Section 68 requires 4logs /ha > 5 metres long, 7.5cm diameter at small end
   b) **Measurable**: Maintain and recruit 3 cubic metres of CWD (over 30cm DBH and all rot stages not just sawlog grade) per hectare through out treatment cycle on the treated area. Number and distribution shall, at least, meet minimums set by FPPR namely as minimum of 4 logs per hectare, greater than 5 metres long and 7.5cm diameter at small end.
   c) Discussion
      i) The life span or CWD in the dry interior is not firmly known but Douglas fir of >30cm DBH appears to cycle from CWD decay Class 1 to 5 in a 15 to 25 year cycle. This should be considered when planning CWD recruitment. It's anticipated that prescribed burns will be prescribed about every 15 to 25 years; CWD should be recruited on every prescribed burn pass.
      ii) Evidence from American reports suggests tree can rot from standing dead to decay stage 5 (equivalent of Canadian decay class 5) using following formulas (Cline 1980 as reported in Everett et al 1988). Report was based on retrospective study of 81 fires in Oregon state dry forest belt. These formulas should be used to estimate the lifespan of existing CWD and to plan the recruitment of more.
         (1) Douglas-fir years to decay state = (-0.102+ 1.99949* (decay state)) squared
         (2) Ponderosa pine is years to decay class = (-.075 + 1.5254 * (decay state)) squared
      iii) It is almost impossible to protect soft wood snags (WT class 4 to 9) or coarse woody debris (CWD class 3 to 5) through even a light intensity maintenance burn. Soft wood must be recruited continuously between burns. Use above numbers as a guide.
   d) Monitoring protocol
      i) Effectiveness Monitoring: CWD composition and density shall be monitored as per the Pandion 2002 report. The longevity and deterioration rates of CWD should also be investigated further than this protocol (Pandion 2002) requires. The natural occurring amount of CWD needs to be more firmly established.
      ii) Routine Monitoring: Photo plots will be re-examined for CWD retention and deterioration during subsequent visits. The fuel management plots and FIREMON and FMA photo guides described in the Routine Monitoring protocol needs to be followed and expanded to allow CWD to be estimated by prescribers. Estimates to be compared before and after treatments.

3.10 WILDLIFE SPECIES AT RISK

Objective:

1) Maintain or increase the species richness and population density of endemic wildlife species in treated areas; with special emphasis in species listed as being red or blue listed by the Conservation Data Centre (CDC).

- **a. Legal Reference**: Section 149.1 FRPA, Section 7 Forest Planning and Practices Regulation section 7, Government Action Regulation (GAR) Section 13, Wildlife Habitat Area (WHA) Orders (see attached table) and Wildlife Habitat Features (WHF) (none to date). Objective 3 (Caribou) Objective 5 (Grizzly Bear and Connectivity Corridors)
- **b. Measurable**; Prior to any Ecosystem Restoration prescription being prepared the prescriber shall check the CDC database for occurrence of red and blue listed species and the Ministry of Environment website for WHAs in the area prescribed for treatment..
- **c. Measurable**; All Prescriptions within a WHA shall follow the general wildlife measures or an exemption shall be asked for with rationale.
- **d. Discussion**;
  a. The Ecosystem Restoration Program doesn't manage wildlife populations nor have the mandate to complete the full inventories to effectively measure this objective. The measures described for overstory, understory, riparian and stand level biodiversity should be treated as coarse filter measures to manage for the species listed in table 3.11.2. Fine filter measures such as ground and call back surveys in areas of known and confirmed red and blue-listed species shall be carried out when necessary.
  b. These plans and prescriptions are reviewed at various levels by the Ministry of Environment Species at Risk Specialist. The opportunity to carry out more detailed monitoring or surveys for Species at Risk should be assessed at an annual basis and practicable or funded opportunities taken with the results fed back into the Ecosystem Restoration program.
  c. The list of species at risk in the Rocky Mountain Trench is attached. The Best management Practices prescribed by *Cooper, J.M., C. Steeger, S .M. Beauchesne, M. Machmer, L. Atwood and E.T. Manning. 2004. Habitat attribute targets for red and blue listed wildlife species and plant community conservation* and various Ministry of Environment publications (specifically the Identified Wildlife Accounts and Measures documents), shall be considered prior to submission for review by a biologist.
- **e.** Prior to any Ecosystem Restoration prescription being prepared, the prescriber shall check the BC Conservation Data Centre for occurrence of red and blue listed species and adapt the prescription to manage for that species using qualified professional opinion and/or best management practices for the species.
- **f. 3.9.3.2** Prior to any Ecosystem Restoration prescription being prepared, the prescriber shall check the FLNRO website for Wildlife Habitat Areas in the area prescribed for treatment. Prescriptions shall be consistent with the General Wildlife Measures contained in the WHA orders or the prescriber will

request a site specific variance from the Regional Resource Management Director with rationale.

g. 3.9.3.5 The Ecosystem Restoration program shall develop a list of rare and endangered vertebrates, plants and plant associations in the Interior Douglas fir and Ponderosa Pine BEC zones within the plan area. Data will come from the Conservation Data Centre location data of actual sightings in the relevant BEC zones.

a. Prescribers and administrators of the Ecosystem Restoration Program shall report unusual habitat features or wildlife sightings to Team Leader Ecosystem Restoration or contract administrator. These unusual habitat features or wildlife sightings will be discussed with Ministry of Environment (Ministry of Environment) in case there is a need for changes in operations, practices or monitoring protocols.

b. As yet no wildlife features have been identified through a Government Actions Regulation. Should the Ecosystem Restoration program find any in the field management will be prescribed for it with guidance from a biologist and *Wildlife Habitat Features Summary of Management Guidelines, Southern Interior Forest Region* (Ministry of Water, Land and Air Protection, 2004).

c. A draft Memorandum of Understanding regarding the management of the Dutch Findlay Range Unit has recently been negotiated between the Ecosystem restoration Program, the Nature Conservancy of Canada, the Nature Trust of Canada and Thunder hill Ranch. This may become the first of several memoranda to set up joint management of large landscape areas between land owners. A specific goal of this program is to retain and develop habitat for Lewis' Woodpecker through open forests and Snag creation. Several more areas could benefit from similar management as this. Table 3.9.2 lists possible Lewis' Woodpecker Areas.

a. **Monitoring**:

i. Effectiveness Monitoring. Monitoring for red and blue-listed species shall be as per the Pandion 2002 report with extra monitoring for yellow badger and Bighorn sheep in areas of known habitat use as per Page 2006. Habitat reports by Nancy Newhouse (Newhouse 2006) shall be incorporated into monitoring strategies.

ii. Routine Monitoring: All practitioners and prescribers on site shall report wildlife sightings to Team Leader Ecosystem Restoration who will forward the information to the CDC.

Table 3.11.1 List of potential Lewis' Woodpecker Management Units (areas of Crown Land)

Management Unit	Range Units	Pasture	Estimated Area (ha)
Dutch Findlay	Dutch Findlay/ Findlay Basin	Spur, Sun, Thunder/ Stinky Saddle	4500

Gold Creek	Gold-Plumbob/ Newgate	Wakefield, Gorrie, Hansen East, Hansen West/ Ash Fire, Alkali, Burlott's, Sharptail, Demers	3700
Elko-Highway 95	Waldo	Burnt Bottom, Sheep Mtn South, Sheep Mtn North, Cutts, Airport, Fusee East, Fusee West	2500
St Mary's Prairie	St Mary's Prairie	Rouse, Artesian Springs, Deep Springs, Sheep Camp, Pine Butte	1650
Grasmere	Grasmere	AI, Bagley's Seeding, Bagley	1450

Table 3.11.2 List of Red Blue listed wildlife species for Rocky Mtn Trench as recommended June 2007 by Conservation Data Centre

Scientific Name	English Name	RISC Code	BC Status	SA RA	Nest/Den	Foraging	Guidelines	WHA?
Amphibians								
Ascaphus montanus	Rocky Mountain Tailed Frog	A-ASMO	Red	1	aquatic/ Riparian, fast clean streams	aquatic/ Riparian, fast streams	BMP for Coastal	WHA-4-046-063
Plethodon idahoensis	Coeur d'Alene Salamander	A-PLID	Blue	1				
Rana pipiens	Northern Leopard Frog	A-RAPI	Red	1	Aquatic, Riparian, wetlands	Aquatic, Riparian, wetlands		
Birds								
Botaurus lentiginosus	American Bittern	B-AMBI	Blue		Riparian, marshes, cattail, emergent vegetation		BMP Ft St John	
Hirundo rustica	Barn Swallow	B-BASW	Blue		Mud nests in overhangs, buildings	Open meadows fields, farmland		
Dolichonyx oryzivorus	Bobolink	B-BOBO	Blue			Pasture and farmland	BMP Ft St John	
Spizella breweri breweri	Brewer's Sparrow, *breweri* subspecies	B-BRSP-BR	Red			Open forest and brush	BMP	
Athene cunicularia	Burrowing Owl	B-BUOW	Red	1	Badger dens		BMP	
Buteo platypterus	Broad-winged Hawk	B-BWHA	Blue		2 Only BC Aspen mixed wood forest	Mixed wood forest	BMP Ft St John	
Otus flammeolus	Flammulated Owl	B-FLOW	Blue	1	Cavity nester, multi layered closed forest		Cooper et al, 2004, BMP	WHA-4-077-085 and 099-101
Ardea herodias herodias	Great Blue heron, *herodias* subspecies	B-GBHE-HE	Blue		Rookeries	Aquatic, Riparian, wetlands	BMP	WHA 4-109 and 4-110

Numenius americanus	Long-billed Curlew	B-LBCU	Blue	1	Open Grasslands, nests on ground, 10cm grass,	Open grasslands	Cooper et al, 2004, BMP	WHA-4-065-075
Ammodramus leconteii	Le Conte's Sparrow	B-LCSP	Blue		Wet grasslands grassy meadows, not south BC	Nests on ground thick clumps grass	BMP Ft St John	Summer resident
Melanerpes lewis	Lewis's Woodpecker	B-LEWO	Red	1	Cavity nester Open Forests	Open Forests, feeds on the wing	Cooper et al, 2004, BMP	WHA-4-001, 002,086,087
Grus canadensis	Sandhill Crane	B-SACR	Blue		Ground nest riparian areas	Feeds riparian areas, meadows, fields, wetlands, lakes	BMP	
Asio flammeus	Short-eared Owl	B-SEOW	Blue	3	Cavity nester		BMP	
Tympanuchus phasianellus columbianus	Sharp-tailed Grouse, *columbianus* subspecies	B-STGR-CO	Blue		Leks	Open grasslands	Cooper et al, 2004, BMP	
Sphyrapicus thyroideus nataliae	Williamson's sapsucker, *nataliae* subspecies	B-WISA-NA	Red	1	Cavity nester, closed forest?	Insectivore, closed forest?	Cooper et al, 2004, BMP	WHA 4-108
Megascops kennicottii macfarlanei	Western Screech-Owl, *macfarlanei* subspecies	B-WSOW-MA	Red	1	Cavity Nester, prefers riparian	Prefers riparian	BMP	WHA 4-113 through 4-115
Fish								
Acrocheilus alutaceus	Chiselmouth	F-ACAL	Blue		Late June early July clean rock, gravel cobble	Slow moderate fast rivers; obligate algae eater	Fish Facts	Found in Lake Windemere
Oncorhynchus clarkii lewisi	Cutthroat Trout, *lewisi* subspecies	F-ONCL-LE	Blue		pea gravel or better, clean substrate highly oxygenated	Fast clear streams	BMP	
Salvelinus confluentus	Bull Trout	F-SACO	Blue		pea gravel or better, clean substrate highly oxygenated	Fast clear streams	BMP	

Mammals								
Corynorhinus townsendii	Townsend's Big-eared Bat	M-COTO	Blue		Loose bark, Cavities Wildlife trees	Insectivore on the wing	BMP	
Gulo gulo luscus	Wolverine, *luscus* subspecies	M-GUGU-LU	Blue		Subalpine snow dens	Everywhere	BMP	
Martes pennanti	Fisher	M-MAPE	Blue			Everywhere	BMP	
Ovis canadensis	Bighorn Sheep	M-OVCA	Blue		Open forests with escape habitat	Open range/ Forest, escape habitat	Cooper et al, 2004, BMP	See FWCP recovery Plan
Taxidea taxus	Badger	M-TATA	Red	1	Subterranean, grasslands, sandy light soils	Grasslands; ground squirrel areas, sandy light soils	Cooper et al, 2004, BMP	WHA-4-088-092, 102, 103 and 106
Ursus arctos	Grizzly Bear	M-URAR	Blue		Sub alpine Krummholtz	Various, slides spring, berry fields fall	BMP	WHA 4-180
Reptiles								
Chrysemys picta pop. 2	Western Painted Turtle - Intermountain - Rocky Mountain Population		Blue		Sandy soils; open forest, clear of shrubs	Aquatic	BMP	

NB since the publication Cooper et al 2003 (JM Cooper, C Steeger, SM Beauchesne, M Machmer, L Atwood, ET Manning, 2003 Habitat Attributes Targets for Red and Blue Listed Species and Plant Community Conservation, Columbia Basin Fish and Wildlife conservation Program

The following species have been delisted for consideration for management in Rocky Mountain District by the Conservation Data Centre: Northern goshawk, white headed woodpecker, Consider adding Common Night hawk

3.12 PLANT SPECIES AND ECOLOGICAL COMMUNITIES AT RISK

Objective:

1. Maintain or increase the species richness and population density of endemic plant species in treated areas.

   a. Legal Reference: Forest and Range Practices Act Section 149.1, Forest Planning and Practices Regulation , Section 7, Government Action Regulation Section 13, WHAs in process

   b. Measurables; Prior to any Ecosystem Restoration prescription being prepared the prescriber shall check the CDC database for occurrence of red and blue listed plants or Ecological Communities in the area prescribed for treatment. Best management practices are to be followed to manage for the species.

   c. Measurable: Should the 6 red and blue listed plant communities (now known as Ecological Communities) described in Cooper et al. (2004) be found on site, the prescriber shall use guidance contained in Cooper et al. while developing the prescription.

   d. Discussion;

   i. The Ecosystem Restoration Program doesn't have the mandate to complete the full inventories to effectively measure this objective. The measures described for overstory, understory, riparian and stand level biodiversity should be treated as coarse filter measures to manage for these plants and communities. Fine filter measurables such as biologic investigation of known confirmed red and blue listed plants and ecological communities shall be considered.

   ii. The list of species and plant communities (now known as ecological communities) at risk in the Rocky Mountain Trench is found in Cooper et al. (2004). Cooper et al's report expands on the ecological community information contained in the CDC lists.

   iii. Prescribers and administrators of the Ecosystem Restoration Program shall report unusual plant and ecological community sightings to Team Leader Ecosystem Restoration or the contract administrator. These sightings will be discussed with the NDT4 Operations Committee in case there is a need for changes in operations, practices, or monitoring protocols.

   h. Monitoring:

   i. Effectiveness Monitoring for red and blue-listed plant and ecological communities shall be as per the Pandion 2002 report

   ii. Routine Monitoring: All practitioners and prescribers on site shall report plant sightings to Team leader Ecosystem Restoration who will forward the information to Conservation Data Centre.

Table 3.12.1 List of Plant Communities (now called Ecological Communities) found in Rocky Mountain Forest District. List is based on Conservation Data Centre list and is found in Cooper, J.M., C. Steeger, S .M. Beauchesne, M . Machmer, L . Atwood and E.T. Manning. 2004. Habitat attribute targets for red and blue listed wildlife species and plant community conservation.

Plant community	Usually occurs in BEC sub zone/ Variant/ site series	Ecosystem Restoration treatment usually acceptable
Douglas-fir/ Snowberry/ balsamroot	IDFdm2/03	Cool fire
Antelope brush/ blue bunch wheatgrass	IDFdm2/02 PPdh2/00	Cool fire
Western snowberry- Idaho fescue	IDFdm2/00	No prescribed fire, Idaho fescue not resistant
Blue bunch wheatgrass junegrass	IDFuu/00 PPdh2/02a; PPdh2/02b	Cool fire
Douglas fir Larch- spruce/ pinegrass	IDFdm2/04	Fire interval 90-150 years
Ponderosa pine trembling aspen/ rose /Solomon's Seal	PPdh2/03	Cool fire
Ponderosa pine/ bluebunch wheatgrass-lupine	PPdh2/01	Cool fire

3.13 UNGULATES:

Objective:

1. Maintain or increase the species richness and population density of endemic wildlife species in treated areas;

a. Legal References: FPRA 149 (1) Forest Planning and Practices Regulation Section 7, Ungulate Winter Range (UWR) Orders U-006 (Cranbrook TSA) and U-008 (Invermere TSA)

b. Measurables The Ecosystem Restoration program shall follow the direction of : Ungulate Winter Range (UWR) Orders U-006 (Cranbrook TSA) and U-008 (Invermere TSA)

c. Discussion

i. For the NDT4 area the Ungulate Winter Range Order prescribes Open Range and Open Forest stands which closely resemble the Timber measurable guidelines already mentioned.

ii. Ministry of Environment shall give direction to all prescriptions covering the UWR. They shall also specify which Range Units require Bighorn sheep visibility protocols at the 5 year plan stage.

iii. Note that the UWR specifies that tree retention shall include 5-20 trees /ha in Open Range sites 1/3 of which must be in the largest diameter range. Further it specifies 76 to 400 stems per hectare to be retained on site with a target of 250 stems /ha in Open Forest types. Further 20 to 50 trees/ha of shall be from the largest diameter range in open forest types. This varies from the Blue Print for Action.

iv. The UWR order provision for larger diameter trees shall prevail when numbers of trees on site are low and the retention rate specified in the Blue Print for Action would fall below 5-20 (Open Range) or 20-50 (Open Forest) large stems per hectare.

v. Remaining tree cover retention requirements are not placed on Open Range and Open Forest but the division of the land base into Open Range, Managed Forest and Open Forest based on site series is recommended for field procedures. (see objective 1 Timber)

d. Monitoring protocol

i. **Effectiveness monitoring** as per Pandion 2002. Bighorn sheep shall require extra monitoring as the addition of the bighorn sheep visibility monitoring protocol shown in Page 2006.

ii. **Routine Monitoring** Ungulate use of the site is to be qualitatively estimated when the prescription is being prepared as well as during and after the slashing and burning stages. The bighorn sheep visibility protocol shall be measured at the prescription, slashing and burn stages as per Page 2006.

3.14 FOREST HEALTH:

Objective:

1. Reduce the incidence of insect and disease incidence and spread in the treated stands.

    a. **Legal Reference:** Forest Planning and Practices Regulation 41-46.2
    b. **Measurable**: Keep root rot incidence to less than 8% of stand affected based on ocular estimates undertaken during routine monitoring surveys of the Ecosystem Restoration blocks.
    c. **Measurable**: Action 50% of all Mountain Pine Beetle infestations within one year of detection, as per the Cranbrook and Invermere Timber Supply Area Forest Health Strategy. Action may not necessarily be taken by Ecosystem Restoration program due to forest licensing constraints.
    d. **Discussion**:
        i. Reducing stand densities to historic levels will over all improve the health of the stands.
        ii. Ministry of Forests and Range does carry out a district wide detection program for all insects and diseases. Small scale salvage or major licensees are typically tasked with harvesting the infestations. The Ministry of Forests Forest Health program deals with other infestations by single tree disposal, lethal funnel traps or trap tree programs dependant on funding levels. Note that as per government policy all forest activities in Rocky Mountain Forest District must follow the approved Forest Health Strategies for both Invermere and Cranbrook TSAs. Currently this strategy (Ministry of Forests and Range 2009a and 2009b) calls for action on
            1. Mountain pine beetle,
            2. Douglas fir bark beetle
            3. armillaria root rot
            4. Dwarf mistletoe,
            5. commandra blister rust,
            6. western gall rust,
            7. northern twig pitch moth and
            8. sequoia pitch moth
        iii. The Ecosystem Restoration Program will participate in the district forest health effort and report forest health concerns discovered by the monitoring actions of the Ecosystem Restoration Program will be reported to the forest health officer. Infestations that can be controlled by the slashing and burning actions of the Ecosystem Restoration Program will be carried out. Forest Health concerns will be considered in all Ecosystem Restoration prescriptions..
        iv. The Rocky Mountain Trench is regarding by the TSA Forest Health Strategy (Ministry of Forests and Range 2009a and 2009b) as being a “holding” Beetle Management Unit due to the low

amount of Mtn Pine beetle in the Trench. Aggressive control action is called for. The Rocky Mountain Forest District is covered by the Emergency Bark Beetle regulation and priority there is placed on suppressing the bark beetles in areas adjacent to the Alberta border so as to avoid he spread of Mtn Pine beetle across the Rocky Mountains. Note as per table 3.4 the bark beetle epidemic is expected to peak in the Rocky Mountain Trench in 2010 and 2011.

Table 3.14.1 Observed (2004 – 2006) and projected (2007 – 2011) annual **green-attack** volume (millions m^3) for the 22 "pine units" (peak year of kill is highlighted by an outlined box). Note that the mortality caused by MPB (green-attack) occurs in the year prior to that in which it is observed by the Provincial Aerial Overview of Forest Health (observed as red-attack). From Walton et al 2004

	Year							
Pine Unit	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Vanderhoof (District)	**25.0**	7.2	3.9	2.0	0.9	0.4	0.2	0.2
Quesnel	**23.8**	11.7	5.1	1.7	0.5	0.2	0.1	0.1
Lakes	**15.0**	9.9	6.2	3.4	1.4	0.7	0.3	0.2
Prince George (District)	**12.5**	8.3	7.7	3.3	1.8	1.0	0.6	0.4
Williams Lake	19.4	**20.8**	17.5	12.9	8.6	5.0	2.7	1.3
100 Mile House	8.6	**18.0**	7.1	2.7	1.3	0.7	0.4	0.3
Kamloops	6.0	**9.1**	6.8	5.1	3.9	2.7	1.8	1.2
Ft. St. James (District)	10.7	8.9	**14.7**	10.8	9.3	7.7	6.3	4.5
Morice	3.7	6.4	5.8	**6.5**	6.0	4.3	2.7	1.6
Lillooet	0.4	0.9	1.2	2.2	**2.9**	2.7	2.0	1.3
Merritt	1.3	2.5	3.9	6.1	7.8	**8.3**	6.7	4.6
Dawson Creek	0.0	0.1	2.7	3.4	4.3	**4.6**	3.6	2.3
Bulkley	0.1	0.1	0.2	0.6	1.5	**2.2**	2.1	1.5
Robson Valley	0.1	0.2	0.3	0.4	0.6	**0.7**	0.6	0.4
Arrow	0.5	0.6	0.2	0.3	0.6	**0.8**	**0.8**	0.6
Mackenzie	0.6	2.1	4.8	5.5	7.9	11.6	**14.2**	13.5
Okanagan	1.0	1.4	1.7	2.6	4.5	6.3	**6.6**	5.6
Invermere	0.2	0.3	0.2	0.3	0.7	1.1	**1.3**	1.1
Golden	0.2	0.3	0.1	0.1	0.2	0.4	**0.5**	**0.5**
Cranbrook	0.6	0.5	0.2	0.4	0.8	1.9	2.9	**3.5**
Boundary	0.1	0.2	0.1	0.2	0.6	1.3	2.0	**2.1**
Kootenay Lake	0.3	0.4	0.2	0.4	0.7	1.1	1.4	**1.5**
Grand Total	130.3	109.8	90.5	70.8	66.7	65.5	59.9	48.1

v. The Nelson Forest Region policy (Norris et al 1998) directs operators to stump and take aggressive action on Armillaria root rot areas. The Ecosystem Restoration Program does promote a

"gappy forest" with a significant wildlife tree component that Armillaria can facilitate (Steeger, Machmer 1995). Much of the NDT4 operating area is on sensitive calcareous soils that can be degraded by stumping (Curran et al 2000). As well, with its decreased volume expectation, the Ecosystem Restoration Program will not take aggressive action as well on root rot pockets. If an ocular estimate at the time of prescription shows the root rot infestation to affect less than 8% of the stand the Ecosystem Restoration Program will prescribe to leave root rot pockets to create as wildlife tree patches but slash the area outside the safe work zone to avoid spread. If the ocular estimate places the root rot level above 8% the Ecosystem Restoration Program shall clear and burn off the root rot centres and burn the site to keep them clear of growing trees for 20 years so as to diminish the root rot infestation.

vi. Dwarf mistletoe, commandra blister rust, western gall rust, northern twig pitch moth and sequoia pitch moth in lodgepole pine are serious forest health concerns in the Rocky Mountain Forest District. Lodgepole pine is a minor stand component in the NDT4 operations area. The standard practice of the Ecosystem Restoration treatment regime is to slash this species to the ground or prescribe fire which should lead to the death of any remaining lodgepole pine trees. As such the Ecosystem Restoration Program will note the occurrence of these diseases and follow its normal treatment prescription.

vii. Rhizina root rot and black army cutworm have also been reported in the district and they do follow forest fires. So far their occurrence has only been on pine and white spruce plantations in the ESSF and ICH Biogeoclimatic zones; not in the IDF and PP zones where the Ecosystem Restoration program operates (Ministry of Forests and Range 2009a and 2009b). If found they will be reported and dealt with.

viii. So far Douglas fir and western pine beetle are in low levels of infestation in the Rocky Mountain Trench. As these trees specifically attack the Douglas fir and Ponderosa Pine forests that the Ecosystem Restoration Program manages for, the Ecosystem Restoration Program will take aggressive control action such as accelerated thinning, funnel traps or trap trees (dependant on funding levels) should the incidence of these pests increase.

e. .Monitoring protocol

i. Effectiveness Monitoring Forest health shall be monitored as per Pandion 2002 report

ii. Routine Monitoring: Photo plots will be re-examined for forest health issues during subsequent visits and during all surveys of the treatment areas. The Ecosystem Restoration Program will participate in district bark beetle detection and suppression program.

3.15 INVASIVE PLANTS:

Objective:

1. Minimise the establishment and spread of priority non-native invasive plant species, particularly noxious species, in treated areas. Priority species are determined through collaboration with the East Kootenay Invasive Plant Program Committee.

   a. Legal Reference: Forest and Range Practices Act Section 47 and Weed Control Act

   b. Measurable: Invasive plant infestations of priority species should not increase from those recorded by the Ministry of Forests and Range, Range Branch for the Range Unit being treated. The Invasive Alien Plants (AIP) application website shall be consulted prior to the writing of any prescription and the invasive plant species found on site shall be noted and infestations forwarded to the East Kootenay Invasive Plant Program Committee (or its successor). See website:

   http://www.for.gov.bc.ca/hfp/invasive/index.htm

   c. Measurable: Ecosystem Restoration program shall prescribe treatment for invasive plant infestations in the Ecosystem Restoration Prescription.

   d. Discussion:

   ii. . Management shall follow Table 6: Synopsis of Invasive plants and Management Implications for Ecosystem Restoration Program in Rocky Mountain Forest District (per Val Miller 2007)

   iii. Bare soil exposed for fireguards shall be reseeded immediately following burn activity or at the next available seeding window, which ever is less. A suitable forage mixture composed of the species listed in Table 3.5 Seeding rate is 12 to 20 kilograms per hectare. This mix is designed to be non persistent, erosion controlling, fast growing to decrease the invasive plant establishment and provide good fuel bed for subsequent firs. It is to a nurse crop for longer term recovery of native grasses.

Table 3.15.1 The Rocky Mountain Forest District preferred grass seed mix a Fescue blend with annual and perennial ryegrass.

Species	% by Weight	% by Species
Slender Wheatgrass	35%	21%
Perennial Ryegrass	25%	23%
Annual Ryegrass	20%	16%
Rocky mountain Fescue	10%	19%
Hard Fescue	10%	21%

   iv. The mix in table 3.15.1 shall also be used in areas of high conservation value and low risk to invasive plant infestations. Note that native species have a very low germination rate so that higher seeding rates of natives or planting of native grass seedling plugs may be in order if naïve seeding is prescribed.

v. Prescribed burn areas will be assessed after the fire to see if grass seeding is required.
vi. Areas proposed for prescribed burns that have large incidence of invasive weeds shall be considered for sloop or pile burning and shall be grass seeded or planted with native grass seed plugs immediately following burn activity or at the next available seeding window, which ever is less.
vii. More detailed description of plant response to fire can be found at In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/.

Table 3.15.2: Synopsis of Invasive plants and Management Implications for Ecosystem Restoration Program in Rocky Mountain Forest District (per Val Miller 2007)

Plant Species	**Management Option**	**Response to Logging or Thinning**	**Response to Prescribed Burn**
Blue weed	Chemical spray: Tordon, Grazon – must treat early in spring (pre-bolt is best), or in fall.	Increase expected through introduction to site by equipment (graders, skidders). Tap-rooted species that spreads by heavy seed.	Unknown - more research is needed.
Common Tansy (*Tanacetum vulgare*)	Chemical spray: Escort	Readily increases along road systems and skid trails. Spreads by seed.	Unknown – more research is needed.
Dalmatian toadflax (*Linaria dalmatica)*	High success rate with biological control agents, although some delay in success on colder sites. Do not rule out chemical spray (Tordon with a surfactant) on small infestation patches	Expect rapid or explosive growth response. Spreads by rhizomes and seed.	Explosive growth of new seedlings onto exposed mineral soil
Diffuse knapweed (*Centaurea diffusa*)	Chemical spray: Milestone, Transline Biological Control: numerous bioagents available – good success on hot, dry sites. Use in areas in East Kootenay where herbicides are not a viable option.	Expect moderate increase if seed source present, exposed soil evident, and canopy is removed. Spreads by seed.	More research is needed. Low severity fires will likely not impact plants or seed bank.
Hoary Alyssum (*Berteroa incana*)	Chemical spray: Dyvel DS, Banvel II, 2,4-D amine. Must be treated early in the season.	Expect Dramatic increase in plant density and distribution if established populations are disturbed while in seed. Shallow rooted annual to short-lived perennial. Spreads by heavy seed – prolific seed producer over an extended period of time.	Unknown – more research is needed.
Hounds tongue (*Cynoglossum officinale)*	High success with biological agent *Mogolones cruciger*	Expect Significant increase on landings, burn piles, and exposed mineral soil sites.	Initial increase if seed source previously on site or close by. Potential to resprout from root crowns. More research is needed.

Leafy Spurge (*Euphorbia esula*)	Chemical spray: Tordon, Grazon	Expect dramatic increase in plant density and distribution as a result of disturbance. Deep rooted species that readily resprouts and spreads by rhizomes.	Plants will likely resprout from root crown, taking full advantage of increased availability of nitrogen.
Orange Hawkweed (*Hieracium aurantiacum*)	Chemical spray: Milestone, Transline – most effective when used with surfactant and N fertilization	Expect explosive increase if seed source present or nearby, or if established plants disturbed by equipment. Spreads by seeds, rhizomes, stolons, adventitious root buds. Slower to establish and spread on extremely dry sites.	Unknown – assume ready colonization due to windborne seed. More research is needed.
Rush Skeletonweed (*Chondrilla juncea)*	Chemical spray: Tordon; Transline (only gives partial control).	Expect significant increase in population following ground disturbance. Spreads by windborne seed and root fragments; a deep rooted plant that can resprout from 1 m depth.	Unknown - Plants will readily resprout from deep root system. Likely to spread into burned areas via windborne seed if seed source nearby. Research is needed.
Spotted knapweed (*Centaurea biebersteinii*)	Chemical spray: Milestone, Transline Biological Control: numerous bioagents available – good success on hot, dry sites. Use in areas in East Kootenay where herbicides are not a viable option.	Expect moderate to significant increase if seed source present, exposed soil evident, and canopy removed. Spreads by seed.	Significant increase in plant density, distribution and vigour. Low severity fires provide limited impact to plants or seed bank. Seeds may not affected by higher intensity fires.
Sulphur Cinquefoil (*Potentilla recta*)	Chemical spray: Milestone	Expect moderate rate of response dependant upon level of disturbance, existing seed source, and amount of shading. Spreads by seed.	Rapid expansion and dense colonization
Yellow, non-native Hawkweeds (*Hieracium piloselloides, H. flagellare, H. floribundum, H. praeltum, H. caespitosum, H. glomeratum*)	Chemical spray: Milestone, Transline – most effective when used with surfactant and N fertilization	Expect explosive increase if seed source is present or nearby, or if established plants are disturbed by equipment. Spreads by seeds, rhizomes, stolons, adventitious root buds. Slower to establish and spread on extremely dry sites.	Unknown – assume explosive colonization due to windborne seed and speed at which species are spreading in province. More research is needed.

e. Monitoring protocol

i. **Effectiveness Monitoring** The under story species composition and production shall be completed following Pandion 2002 report

ii. **Routine Monitoring**: Photo plots and plot data will be re-examined for invasive plants during subsequent visits.

3.16 SOILS:

Objectives:

1. Maintain soil fertility and minimize soil erosion and compaction in treated area.

   a. Legal Reference: Forest and Range Practices Act 149 (1) Forest Planning and Practices Regulation 5 and 35 -38. EPR shall abide by FPPR direction

   b. Measurable: Permanent access in treatment areas is to be kept below 7% of the gross area of the area under prescription. Increases above this number may be made but only the cases listed in FRPA (e.g. very small block, mainline located in centre of the block) and documentation of the rationale kept on file.

   c. Measurable: Temporary disturbance is to be less than 10% of the area under prescription on medium or low hazard soils and under 5% on sensitive or high hazard soils.

   d. Measurable: Maintain natural drainage patterns and do not contribute to landslide hazards.

   e. Measurable Bladed soil created by Ecosystem Restoration projects shall be revegetated within one growing season of the disturbance.

   f. Discussion

   i. It is almost impossible to measure the soil fertility and productivity aspects of soil management during standard operations. Above measurables are FRPA standards required by all licensees.

   g. Monitoring protocol

   i. Effectiveness Monitoring soil issues shall be monitored as per Pandion 2002 report

   ii. Routine Monitoring: On any treatment area soil erosion and compaction shall be monitored qualitatively during all Ecosystem Restoration and range monitoring visits. The areas disturbed on any treatment area shall be measured and evaluated after any equipment pass on a treatment unit and documentation will be kept on the opening file.

3.17 RECREATION:

Objective:

1 Meet declared recreation objectives.

a. Legal Reference Forest and Range Practices Act Section 180/181 and 56 , Forest Practices Code Section 6

b. Measurable: **Measurable** Ecosystem Restoration program shall manage consistent with the objectives for any recreation sites or trails falling with the NDT4 area and act in concert with the District Recreation Officer.

c. Discussion

i. List of Recreational Trail objectives is on file at the Ministry of Forests and Range office at: G:\!Workgrp\wpdocs\ECOSYSTEM RESTORATION\Plans & Planning\Higher Level Plans. Summarised in Table 3.17 below.

ii. Ecosystem Restoration Program shall be consistent with the Management Plan for the Cranbrook Community Forest when active in the Alkali or Cranbrook Fort Steele Range Unit pastures that fall within the Community Forest.

e. Monitoring protocol All Ecosystem Restoration staff shall monitor treated areas for the need for access management and recreation use management with every site visit and record incidents on opening files.

Table 3.17 List of recreation sites and objectives applicable to the Ecosystem Restoration Program

Proj No.	Project Name	Type	Estab. (yr/m/d)	Range Unit	Size (ha)	Length (km.)	Objectives
6773	Boivin Creek Trail	Trail	07-10-17	Peavine	7	14.3	01/11/02 The objective is to manage the Boivin Creek recreation trail for a forested, semi-primitive non-motorized recreation experience. Maintain the trails and day use shelters; conserve the adjacent vegetation through a management agreement with a user group. Provide opportunities for cross country skiing, hiking, mountain biking and equestrian uses. Provide non-motorized recreation access on designated trails except for trail maintenance, grooming or track setting activities.
6259	Kootenay White Junction	Site	99/05/21	Watson	7		2001/02/22 The objective is to manage Kootenay/White Junction recreation site for a roaded recreation experience. The campsite will be maintained and any random sites on the floodplain will be removed. Opportunities for camping, picnicking, whitewater pursuits and viewing will be available at the site.
2177	Johnson Lake	Site	80/12/11	Sheep Creek North	49		2001/02/22 The objective is to manage the Johnson Lake recreation site for a lakeside, roaded recreation experience. The campsite will be maintained; the lake shoreline and natural vegetation will be conserved. Opportunities for camping, picnicking, nature study and swimming will be available at the site.
5228	Engstrom's Pond	Site	99/05/21	Findlay Basin	8		2001/05/01 The objective is to manage Engstrom's Pond recreation site for a roaded recreation experience. The campsite will be maintained; the lake shoreline and natural vegetation will be conserved. Opportunities for camping, picnicking and angling will be available at the site. The site access road will be unmaintained and suitable for high clearance and 4x4 vehicles.
6327	Findlay Falls	Site	99/05/21	Findlay Basin	14.8		2001/05/01 The objective is to manage Findlay Falls recreation site for a day use, non-roaded recreation experience. The natural vegetation along the canyon and trail will be conserved. Day use facilities will be limited to a vehicle parking site and foot trail available for non-mechanized use only. No overnight camping.
5124	Castle Rock Trail	Trail	94/03/17	Westside		5.2	2001/05/01 The objective is to manage the Castle Rock recreation trail for a forested and subalpine semi primitive non motorized recreation experience. The trail will be maintained and adjacent vegetation conserved. Opportunities for hiking and equestrian uses are available, no mechanized uses permitted.
5227	Findlay Creek	Site	99/05/21	Findlay Basin	15		2001/05/01 The objective is to manage the Findlay Creek recreation site for a creekside, roaded recreation experience. The campsite will be maintained; the creek shoreline and natural vegetation will be conserved. Opportunities for camping, picnicking, swimming and viewing will be available at the site.
5516	Lake Enid Forest Swamp Tr	Trail	94/03/13	Toby Horsethief	-	3.8	2001/05/01 The objective is to manage the Lake Enid Forest Swamp recreation trail for a forested and subalpine semi primitive non motorized recreation experience. The trail will be maintained and adjacent vegetation conserved. Opportunities for hiking and interpretation on local ecosystems are available through a self guided interpretative trail. No mechanized uses permitted.
2008	Lake Enid	Site	80/12/11	Toby Horsethief	10		2001/05/01 The objective is to manage the Lake Enid recreation site for a lakeside, roaded recreation experience. The campsite will be maintained; the lake shoreline and natural vegetation will be conserved. Opportunities for hiking , picnicking, car top boat launching swimming and nature study will be available at the site.
2175	Larchwood Lake	Site	94/03/17	Torrent	99		2001/05/01 The objective is to manage the Larchwood Lake recreation site for a lakeside, roaded recreation experience. The campsite will be maintained; the lake shoreline and natural vegetation will be conserved. Opportunities for camping, picnicking, car top boat launching and swimming will be available at the site.

2001	Lillian Lake	Site	94/03/17	Toby Horsethief	2		2001/05/01 The objective is to manage the Lillian Lake recreation site for a lakeside, day use, and roaded recreation experience. Day use facilities will be maintained; the lake shoreline and natural vegetation will be conserved. Opportunities for picnicking, beach activities and swimming will be available at the site. No overnight camping. Electric motors only.
5517	Living Forest Rec. Tr.	Trail	94/03/17	Toby Horsethief	-	2.2	2001/05/01 The objective is to manage the Living Forest recreation trail for a forested and subalpine, semi primitive non motorized recreation experience. The trail will be maintained and adjacent vegetation conserved. Opportunities for hiking and nature interpretation are available. No motorized uses permitted.
6160	Mt. Stevens Trail	Trail	95/02/09	Lewis-Wolf	-	9	2001/05/01 The objective is to manage the Mount Stevens recreation trail for a forested and subalpine semi primitive non motorized recreation experience. The trail will be maintained and adjacent vegetation conserved. Opportunities for hiking and equestrian uses are available, no mechanized uses permitted.
2002	Swansea Mountain	Site	95/02/09	Windermere Fairmont	0.2	0.5	2001/05/01 The objective is to manage the Swansea Mountain recreation site and trail for a subalpine, semi primitive non mechanized recreation experience. The look out and trail will be maintained; the alpine vegetation will be conserved. Opportunities for viewing and picnicking will be available at the site. Access is by non mechanized trail.
2169	Tamarack Lake	Site	94/03/17	Torrent	59		2001/05/01 The objective is to manage the Tamarack Lake recreation site for a lakeside, roaded recreation experience. The campsite will be maintained; the lake shoreline and natural vegetation will be conserved. Opportunities for camping, picnicking, car top boat launching and swimming will be available at the site.
2182	Whitetail Lake	Site	84/07/12	Findlay Basin	73		2001/05/01 The objective is to manage Whitetail Lake recreation site for a roaded recreation experience in a high use setting. The campsite will be maintained and rehabilitated in future. The shoreline and natural vegetation will be served. Opportunities for camping, picnicking, boating and swimming will be available. Waterskiing will not be permitted.
2003	Windermere Wells	Site	99/05/21	Windermere-Fairmont	24		2001/05/01 The objective is to manage Windermere Wells recreation site as a walk in, day use site with minimal facilities. Trail head parking is available as opportunities for picnicking and diving. The adjacent vegetation at the trail and site will be conserved. Motorized use or access, and overnight camping, are not permitted.
5162	Lost Creek (Englishman)	Map	98/07/31	Gold Plumbob	42		2001/11/02 The objective is to manage the Englishman Creek recreation site for a lakeshore, roaded recreation experience. Maintain a campsite; conserve lake shoreline and natural vegetation. Provide opportunities for camping, picnicking, boat launching and beach activities.
2206	7 Mile Lake	Site	97/05/01	Gold Plumbob			98/02/20 The objective is to manage the 7 Mile Lake recreation site for a lakeshore, roaded recreation experience. Maintain a campsite; conserve the lake shoreline and natural vegetation. Provide opportunities for camping, day use, picnicking, boat launching and beach activities.
2353	Bear Lake Trail	Trail	97/05/01	Wildhorse Lewis	2.3	2.3	98/02/20 The objective is to manage the Bear Lake recreation trail for a subalpine, semi-primitive non-motorized recreation experience. Maintain the trail; conserve the adjacent vegetation. Provide opportunities for hiking, day use and primitive camping.
5188	Big Spring	Site	97/05/01	Grasmere	10		98/02/20 The objective is to manage the Big Springs recreation site for a lakeshore, roaded recreation experience. Maintain a campsite; conserve lake shoreline and natural vegetation. Provide opportunities for camping, picnicking, boat launching and beach activities.
2037	Blue Lake	Site	97/05/01	Findlay Basin	1		98/02/20 The objective is to manage the Blue Lake recreation site for a lakeside, roaded recreation experience. Maintain a campsite; conserve the lake shoreline and natural vegetation. Provide opportunities for camping, day use, picnicking and boat launching.

6476	Cranbrook Comm For Inter	Site	00/09/29	alkali lakes	2187		98/02/20 The objective is to manage the Cranbrook Community Forest interpretive forest for interpretive opportunities within a range of recreation experiences from semi-primitive non-motorized, roaded to rural varying with the proximity to the city. Maintain roads, trails and day use facilities; conserve forested, grassland, riparian and meadow areas. Provide opportunities for nature study, viewing, hiking, mountain biking, picnicking, horse riding and snowshoeing. Provide forest education and interpretation opportunities on local ecosystems and forest practices through brochures, self-guided interpretive trails and signs. Provide motor vehicle access on designated roads with low risk of environmental damage. Accommodate public use during day time without campfires. Prepare a management plan to guide operations and activities within the forest.
5110	Dewdney Trail	Trail	97/05/01	Wildhorse Lewis	40	2	98/02/20 The objective is to manage the Dewdney recreation trail for a forested, semi-primitive non-motorized recreation experience consistent with the Dewdney Trail Plan. Maintain as a heritage trail; conserve the adjacent vegetation. Provide opportunities for hiking, viewing, mountain biking and equestrian use.
5192	Dorr Road	Site	01/06/06	Grasmere	256		98/02/20 The objective is to manage the Dorr Road recreation site for a lakeshore, roaded recreation experience. Maintain a campsite; conserve lake shoreline and natural vegetation. Provide opportunities for camping, picnicking, boat launching and beach activities.
2204	Edwards Lake	Site	80/12/11	Grasmere	26		98/02/20 The objective is to manage the Edwards Lake recreation site for a lakeshore, rural recreation experience. Maintain a campsite; conserve the lake shoreline and natural vegetation. Provide opportunities for camping, day use, picnicking, boat launching and beach activities.
5191	Gold Creek Bay	Site	97/05/01	Newgate	28		98/02/20 The objective is to manage the Gold Bay recreation site for a lakeshore, roaded recreation experience. Maintain a campsite; conserve lake shoreline and natural vegetation. Provide opportunities for camping, picnicking, boat launching and beach activities.
5079	Hahas Lake	Site	97/05/01	Cherry Tata	245		98/02/20 The objective is to manage the Hahas Lake recreation site for a lakeshore, roaded recreation experience. Conserve the lake shoreline and natural vegetation. Provide opportunities for camping, picnicking, boat launching and beach activities.
5630	Hart Lake	Site	97/05/01	Waldo	36	-	98/02/20 The objective is to manage the Hart Lake recreation trail for a forested, rural recreation experience. Maintain the trail; conserve the adjacent vegetation. Provide opportunities for hiking, viewing and mountain biking.
2092	Horseshoe Lake	Site	86-03-13	Peckhams Lake	110		98/02/20 The objective is to manage the Horseshoe Lake recreation site for a lakeshore, rural recreation experience. Maintain a campsite; conserve the lake shoreline and natural vegetation. Provide opportunities for camping, day use, picnicking, boat launching and beach activities. Provide access within the site on designated roads.
2215	Kikomun Creek	Site	97/05/01	Waldo	1		98/02/20 The objective is to manage the Kikomun Creek recreation site for a creekside, roaded recreation experience. Maintain a campsite; conserve the creek shoreline and natural vegetation. Provide opportunities for camping, day use and picnicking.
2366	Lakit Lookout & Trail	Trail	97/05/01	Wildhorse Lewis		3	98/02/20 The objective is to manage the Lakit Lookout recreation trail and site for a subalpine, semi- primitive non-motorized recreation experience. Maintain the shelter and trail; conserve the adjacent vegetation. Provide opportunities for hiking, viewing and picnicking.
5157	Lazy Lake	Site	97/05/01	Lewis-Wolf	27		98/02/20 The objective is to manage the Lazy Lake recreation site for a lakeshore/benchland, rural recreation experience. Maintain separate campsite and day use areas; conserve the lake shoreline and natural vegetation. Provide opportunities for camping, picnicking, boat launching and beach activities at the campsite. Accommodate public use of the day use area during day time without campfires. Provide access within the site on designated roads.
2205	Loon Lake	Site	86/03/13	Grasmere	38		98/02/20 The objective is to manage the Loon Lake recreation site for a lakeside, rural recreation experience. Maintain a campsite; conserve the lake shoreline and natural vegetation. Provide opportunities for camping, day use, picnicking, boat launching and beach activities. Provide access within the site on designated roads.

2360	Mause Cr./Tanglefoot Trail	Trail	97/05/01	Peckhams Lake	7	7	98/02/20 The objective is to manage the Mause Cr./Tanglefoot recreation trail for a forested/subalpine, semi-primitive non-motorized recreation experience. Maintain the trail; conserve the adjacent vegetation. Provide opportunities for hiking, equestrian use, day use and primitive camping.
5905	Mause/Sunken Cr. Trail	Trail	97/05/01	Peckhams Lake	9	4.5	98/02/20 The objective is to manage the Mause/Sunken Cr. recreation trail for a forested/subalpine, semi-primitive non-motorized recreation experience. Maintain the trail; conserve the adjacent vegetation. Provide opportunities for hiking, viewing, equestrian use and primitive camping.
2218	Caven Cr. / Mazur Meadows	Site	97/05/01	Gold Plumbob	55		98/02/20 The objective is to manage the Mazur Meadows recreation site for a creekside, roaded recreation experience. Maintain a campsite; conserve the creek shoreline and natural vegetation. Provide opportunities for camping, day use and picnicking.
2355	Mt Fisher Trail	Trail	97/05/01	Peckhams Lake		3	98/02/20..The objective is to manage the Mt. Fisher recreation trail for a subalpine/alpine, semi- primitive non-motorized recreation experience. Maintain the trail; conserve the adjacent vegetation and features. Provide opportunities for hiking and day use.
5283	Mt Stephens Trail	Trail	97/05/01	Lewis-Wolf	4.5	4.5	98/02/20..The objective is to manage the Mt. Stephens recreation trail for a forested/subalpine, semi-primitive non-motorized recreation experience. Maintain the trail; conserve the adjacent vegetation. Provide opportunities for hiking and viewing.
5904	Nichol Pass Trail	Trail	97/05/01	Lewis-Wolf	8	4	98/02/20..The objective is to manage the Nicol Pass recreation trail for a forested, semi-primitive non-motorized recreation experience. Maintain the trail; conserve the adjacent vegetation. Provide opportunities for hiking, viewing and mountain biking.
2209	North Star Lake	Site	86/03/13	wa	26		98/02/20..The objective is to manage the North Star Lake recreation site for a lakeside, rural recreation experience. Maintain a campsite; conserve the lake shoreline and natural vegetation. Provide opportunities for camping, day use, picnicking, boat launching and beach activities. Provide vehicle access within the site on designated roads.
2221	Rock Creek	Site	97/05/01	Waldo	1		98/02/20..The objective is to manage the Rock Creek recreation site for a creekside, roaded recreation experience. Maintain a campsite; conserve the creek shoreline and natural vegetation. Provide opportunities for camping, day use and picnicking.
2213	Sand Lake	Site	97/05/01	Pickering Hills	2		98/02/20..The objective is to manage the Sand Lake recreation site for a forested, roaded recreation experience. Maintain a campsite; conserve the lake shoreline and natural vegetation. Provide opportunities for camping, picnicking and day use.
2357	South Star Trail	Trail	97/05/01	Peavine	1436	27	98/02/20..The objective is to manage the South Star recreation trails for a forested, semi-primitive non-motorized recreation experience. Maintain the trails; conserve the adjacent vegetation. Provide opportunities for cross country skiing, hiking, mountain biking and equestrian uses. Provide non-motorized recreation access on designated trails except for trail maintenance, grooming or track setting activities.
2207	Suzanne Lake	Site	97/05/01	Waldo	3		98/02/20..The objective is to manage the Suzanne Lake recreation site for a lakeshore, rural recreation experience. Maintain a campsite; conserve the lake shoreline and natural vegetation. Provide opportunities for camping, day use, picnicking, boat launching and beach activities. Provide access within the site on designated roads.
5173	Tie Lake	Site	97/05/01	Pickering Hills	8		98/02/20..The objective is to manage the Tie Lake recreation site for a lakeshore, rural recreation experience. Maintain separate campsite and day use areas; conserve the lake shoreline and natural vegetation. Provide opportunities for camping, picnicking and beach activities. Provide access within the site on designated roads. Accommodate public use of the day use area during day time.
2210	Wapiti Lake	Site	86/03/13	Colvalli North	62		98/02/20..The objective is to manage the Wapiti Lake recreation site for a forested/lakeside, roaded recreation experience. Maintain a campsite; conserve the lake shoreline and natural vegetation. Provide opportunities for camping, day use, picnicking, boat launching and beach activities. Provide access within the site on designated roads.

3.18. VISUAL QUALITY

Objective:
1 Meet declared visual quality objectives.

1. **Legal Reference** KBLUP Management Guidelines for NDT4 systems Objective 9 KBLUP, Forest and Range Practices Act 9.2
2. **Measurable**; All tree harvesting prescriptions should meet existing declared visual quality objectives (VQO) due to retention strategies of Ecosystem Restoration program.
3. **Discussion**
    a. Note that the KBLUP management Guidelines for NDT4 systems notes that it is the unlikely that Ecosystem Restoration actions will create a VQO conflict. Further, if a conflict arises the NDT4 guidelines prevail.
    b. As most Ecosystem Restoration treatments retain trees and site and recreate a historic mosaic of grasslands, open forests and treed grasslands it is unlikely the impact of Ecosystem Restoration treatments will degrade the existing viewscape or fail to meet retention or partial retention VQOs.
    c. The VQO shall be noted in each prescription; source of information shall be by reviewing the FDP or FSP maps of the major Forest Licensee for the area. The majority of VQOs for the Rocky Mountain Trench are modification and partial retention.
4. **Monitoring protocol** Ecosystem Restoration program shall review VQO issues with the Ministry of Forests and Range and MOTSA staff during the annual submission of the five year plan and take action as required.

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3.19 ACCESS MANAGEMENT:

Objective:
1 Meet declared access management objectives and manage access so as to decrease off road vehicle damage to the open forests and grasslands.

d. Legal Reference Forest and Range Practices Act Section 180/181 and 56 , Forest Practices Code Section 6

e. Measurable: Access control is to be considered in each prescription and appropriate action prescribed and implemented. Actions are to be documented and kept on Opening or Ecosystem Restoration Plan files.

f. Measurable: Ecosystem Restoration Program shall be consistent with declared access management orders issued under the Wildlife and Forest and Range Practices Acts.

g. Discussion

i. Access management requires legal action and referral process from Ministry of Forests and Range or Ministry of Environment. Access restrictions and management plans are a process separate from Ecosystem Restoration operations. Ecosystem Restoration operations will close off and grass seed what new trails or fire guards are constructed during operations. Ecosystem Restoration Program will participate in all access management discussions.

ii. Ecosystem Restoration Program shall, as a matter of course, abide by existing access restrictions. Table 3.20 is to be consulted during prescription development time and the MOE website checked prior to sealing of prescriptions.

iii. Refrain from treated an site with high recreation use and damage to the grasslands until the recreation and access use issues are addressed in higher level access planning processes.

f. Monitoring protocol All Ministry of Forests and Range and Ministry of Environment staff shall monitor treated areas for the need for access management and recreation use management with every site visit. Documentation is to be in the prescription or in inspections forms stored on the opening file.

Table 3.19.1 List of Wildlife Act Access Management Areas in the NDT4 Ecosystem Restoration operating area (as per 2009 Hunting Regulation synopsis http://www.env.gov.bc.ca/fw/wildlife/hunting/regulations/)

Restoration Unit	Ministry of Environment Management Unit	Dates of Closures	Comments
Wigwam Flats	4-2	Year round	See map most main roads open
Grasmere (east of Highway 95)	4-2 Galton Range	Year round	See map main roads open
Cranbrook-Elizabeth Lake	4-3 Elizabeth Lake	Year round	
Gold Plumbob-Pinchecks	4-3 Linklater Lakes	Year round	See map, main roads open
East Columbia	4-25 East Columbia WMA	Most minor roads December 1-April 30	Check maps, main roads open year round, minor open May 1 November 30
Stoddart Creek	4-25 Shuswap Creek to Kootenay National park	Year round	See map only road up Shuswap Creek is open
Dutch Findlay-Spur, Sun, Thunder, stinky, Saddle pastures	4-26 Dutch Findlay	Most minor roads December 1-April 30	Check maps, main roads open year round, minor open May 1 November 30
Waldo-	4-22 Baynes Lake Koocanusa	April 15-June 30	No public access at all, dogs must be leashed April 1 to 15 and July 1-August 1st
Cherry Tata-TNT property	4-21- Cherry Creek ranch and Bummers Flats	Year round	Highway three access roads open, see map
Premier Ridge-All	4-21 Premier Ridge	December 1-April 30	See map
Pickering Hills; all	4-22 Pickering Hills	Year round	Check maps, main roads open year round,
Waldo-Sheep Mtn north, Cutts Road	4-22 Sheep Mountain	Year round	Check maps, main roads open year round,
Powerplant; all	4-22 Powerplant	Most minor roads December 1-April 30	Check maps, main roads open year round, minor open May 1 November 30

3.20 **ARCHAEOLOGICAL RESOURCES:**

Objective

1. Is to maintain unimpaired all known archaeological sites within treatment areas and comply with the Heritage Conservation Act.
   - **a. Measurable** During the FSP submission the Ecosystem Restoration program shall suggest strategies (i.e. avoidance, machine operation only on snow pack or frozen soils, or preliminary field reconnaissance) to address all overlaps between Ecosystem Restoration prescriptions and high to medium archaeological polygons.
   - **b. Measurable**: All Ecosystem Restoration Prescriptions that overlay medium to high potential archaeological polygons will be considered for examination by an archaeologist acceptable to First Nations. Recommendations for treatments (e.g. avoidance, treat only under sufficient snow pack) will be discussed with the archaeologist and incorporated into the Ecosystem Restoration Prescription.
   - **c. Measurable**; further to b above an archaeological assessment shall be completed for any Ecosystem Restoration operation that requires the exposure of earth (i.e. the constriction of new road, landing, fireguard or reopening an existing road) within a medium to high archaeological polygon prior to work commencing. Operations shall respect the recommendations of the assessment.
   - **d. Discussion**
     - i. Archaeologist will decide if excavation and archaeological permits are needed.
     - ii. Ecosystem Restoration Program will maintain standing contract with archaeologist who will carry out surveys on an ongoing basis throughout the summer or snow free period.
     - iii. Where pile and burn operations are proposed within medium and high potential archaeological polygons Ecosystem Restoration operations shall follow guidelines worked out with Robert Williams of the K'tnuaxa Land Resources. These guidelines involve piling and burning on:
       - **c.** Piles are on previously disturbed areas
       - **d.** Piles are not on terrace edges/bench edges, but on slopes or at base, preferably on slopes.
       - **e.** Tree throws that have no obvious cultural materials.
       - **f.** Rock outcrops if no cultural significance is identified (i.e. pictographs, rock quarries, petroglyphs)
       - **g.** In smaller piles because heat intensity would be less but the placement of the piles must also be considered
     - iv. The Ecosystem Restoration program shall incorporate into its planning
       - **c.** Where deemed necessary half day training sessions where a archaeologist or a First Nations Lands and Resource staff can

training up machine operators as to how best carry out operations in sensitive archaeological areas.

d. Follow-up monitoring inspections by archaeologists to ascertain impact of Ecosystem Restoration operations to archaeological resources where it appears to the Ecosystem Restoration inspector that an impact may have occurred to archaeological resources..

e. Monitoring protocol. Ministry of Forests and Range will keep all archaeological reports in the opening file for future monitoring and guidance. Starting in 2008 the Ecosystem Restoration program shall hire and work with an archaeologist to establish pre and post treatment plots to ascertain any impacts to archaeological resources that Ecosystem Restoration treatments specifically pile burning may have on archaeological resources.

3,21 CULTURAL AND HERITAGE RESOURCES:

Objective

1. Is to maintain unimpaired all known First Nations Cultural and Heritage Resources within treatment areas.

   a. Legal reference: Forest and Range Practices Act 149 (1), Forest Planning and Practices Regulation Section 10 a) and b)

   b. Measurable Strategy Ecosystem Restoration Program will meet at least once annually with First Nations and discuss all proposed Ecosystem Restoration treatments on all areas of the Trench. Recommendations from First Nations shall be reviewed and considered for incorporation into the Ecosystem Restoration Prescriptions.

   c. Measurable: Ecosystem Restoration prescribers shall note, in the Ecosystem Restoration prescription the occurrence of plant species noted by experts as being "cultural keystone species". The current list (by Mike Keefer, personal communication, 2008) is blue camas, bitter root, Soopallalie, Saskatoon berry. See table below

   d. Discussion
   Cultural and Heritage resources from European settlers with be discussed with local residents and those concerns addressed in the prescription.

   d. Monitoring protocol. Ministry of Forests and Range will keep all records of these discussions on five year plan file for future auditing and follow up. The performance of cultural keystone species shall be noted through photo plots taken under routine and effectiveness monitoring.

Table 3.21 Probable effects of light frequent fires actions on cultural keystone species (Source Fire Effects Information system http://www.fs.fed.us/database/feis/plants/index.html)

Common name	Latin name	Effect of light frequent fire
Blue camas or Small Camas	Camassia quamash	Top kills camas especially in spring, one report lists camas increases with burning. Frequent fires known to be a First Nations cultivation technique. Maybe present in Wigwam RU
Bitter root	Lewisii rediviva	No data found but plant is known to gown in very dry soils under open range conditions.
Soopallalie (russet buffalo berry)	Shepherdia canadensis	Resprouts or reseeds after fire; fire increase density and vigour. Fairly resistant to burning.
Saskatoon berry	Amelanchier alnifolia	Resprouts easily from root collar even after severe fires. In forests it is fire dependant as fire decreases competing vegetation. Fire return periods for western Montana were 2 to 48 years. In general plant usually increases or is unaffected by fire.

3.22 REMOVING NATURAL RANGE BARRIERS

Objective

1. Maintain range barriers so that range licensees can control and manage the distribution and forage use of their cattle.

    a. **Legal reference**: Forest and Range Practices Act Section 48, Forest Planning and Practices Regulation Section 18
    b. **Measurable** Ecosystem Restoration program shall not open up closed forests that would change the distribution of cattle and shall ensure that any fence damaged by Ecosystem Restoration practices is repaired to acceptable standards.
    c. Discussion
        i. This is more a strategic level direction. Ecosystem Restoration program shall meet with ranchers, or at least refer projects to them, prior to commencement of activities. The range licensees shall be asked to designate areas required to be kept as natural barriers. As a first option Ecosystem Restoration program, shall designate strips of timber or ravines to be left untreated so as to maintain natural barriers between pastures. Fence construction shall only be considered if priorities are high and there is no other option; Ecosystem Restoration program cannot really under take large scale fence reconstruction projects.
        ii. Range improvements (fences, water troughs etc.) are to be protected during ecosystem restoration operations (logging slashing and especially prescribed burns). If damage is created, the Ecosystem Restoration Program is to finance repairs in consultation with the range licensees.
    d. **Monitoring protocol**. Ministry of Forests and Range will keep all records of these discussions on five year plan file for future auditing and follow up. Fence lines and natural barrier corridors shall be inspected as a matter of course during the final inspection of any project undertaken under Ecosystem Restoration.

3.23 PRESCRIBED BURNS:

Objective

1) Rank 3 burn during initial prescribed burn and a rank 2 burn during maintenance burns. Rank 3 burns have rate of spread of 1.5 to 3 metres per minute, with 2 metre high flames and an organised front and may display candling. Rank 2 fires spread at less than 1.5 metre per minute with a disorganised head and virtually no candling.

a. Legal Reference: Wildfire Regulation requires all possible man made fire hazards to be evaluated and acted upon. Open burning Regulation controls venting and air quality concerns. Ecosystem Restoration program will follow direction in regulation.

b. Measurable of initial burn;

i. reduce 80% fuels < 5cm diameter,
ii. kill 80% of trees under 3 metre tall,
iii. maintain seed bank and nutrients by creating a moderate fire over 75% of the burn area as determined by a post fire evaluation using the US National Parks Service Fire monitoring Handbook FMH 21 And FMH 22 criteria. (National Parks Service, 2003)
iv. time the burn to avoid killing grass growing points,
v.do not burn more than 10% of pole and co-dominant trees,
vi. cover 75% of area with burn,
vii. lift live canopy to 1.5 metres

c. Measurable of maintenance burn;

i. kill 80% trees under 3 metre tall,
ii. maintain seed bank and nutrients by creating a moderate fire over 75% of the burn area as determined by a post fire evaluation using the US National Parks Service Fire monitoring Handbook FMH 21 And FMH 22 criteria. (National Parks Service, 2003)
iii. time the burn to avoid killing grass growing points,
iv. do not burn more than 10% of pole and co-dominant trees (need 5% for recruitment as WT and CWD),
v.cover 75% of area with burn,
vi. lift live canopy to 1.5 metres

d. Discussion

i. Light up requires a burn plan accepted by Ministry of Forests and Range Wildfire Management Branch and under venting conditions set by Ministry of Environment Open Burning Smoke Control Regulation. This legislation requires that the burn come off safely, with minimal risk to public or private resources and that the smoke be vented away within 4 days of light up.
ii. Majority of prescribed burns are to be carried out by Ministry of Forests and Range district staff but Ecosystem Restoration Program shall reach out to contractors, other agencies and the Ministry of Forests and Range

Protection branch to increase capacity for burns in the narrow windows available.

iii. Only low intensity fires (less than 20% of standing co-dominant trees burnt) to be considered here due to proximity to habitations and high risk area with large existing fuel build ups. The High severity fires in the mixed fire spectrum are still occurring naturally even with strenuous suppression activities.

iv. Spring burn fire weather indices are currently Duff Moisture Code (DMC) of less than 40, Fine Fuel Moisture Content (FFMC) of 88 to 93, Drought Code of 200 to 700, Minimum temperature of 18 degrees centigrade, wind speed of no more than 20 kilometres an hour, Relative humidity of 20%. The intent is a low intensity fire with a slow rate of spread of up to 3 meters/minute is desired. Flame height may vary from 0.5 to 2 meters. Venting must be good for at least 48 hours after the burn light up and smoke mostly extinguished with 96 hours of light up.

v. Indices for fall burns must be developed with a suggestion that FFMC should be 55 and a higher DMC. Intent is to consume larger fuels and heavy slashing areas. Typically achieving a good venting window can be a larger issue in fall burns.

d. Monitoring protocol

i. Intensive Monitoring: As per draft Routine Monitoring protocol. Fuel plots recording down and standing fuels are to be established including photo points. This is to build on existing data bases (FMA plus or Kamloops fuel plot index) and create a district data base of photo plots to allow burn bosses to predict fuel loading, fire behaviour and track the evolution of CWD and WTs. Plots are to be fed into fire behaviour prediction models (FMA plus and Prometheus) so as to expand our ability to predict fire behaviour.

ii. Routine Monitoring: Five photo plots per fire are to be revisited pre and post burn, data recorded for fuel reduction and vegetative response as per draft Routine Monitoring protocol. Fire behaviour to be recorded during burn and this data fed into all other aspects of monitoring and research. Post fire evaluation plots are to be carried out on all fires within one growing season of ignition. Fuel loading is to be estimated pre and post fire by photo plots found in FMA plus and the Kamloops fuel plot index.

3.24 FUEL MANAGEMENT:

Objective

1) Deal with all fuel management issues within one year pif creating fdebris or possible fire hazrd issues.

e. Legal Reference: Wildfire Regulation requires all possible man made fire hazards to be evaluated within three months of and for a professional to assess the fuel hazard. Open burning Regulation controls venting and air quality concerns. Ecosystem Restoration program will follow direction in regulation.

f. Measurable of fuel management;

i. All prescribers shall estimate potential fuel loading, potential hazard and risks in he prescription

ii. The risks, loading and hazard shall be re examined on completion of activities

iii. Methodology of hazard abatement and assessment of risk shall be recorded on opening file end forwarded to Wildfire Management branch.

g. Discussion

i. Most Ecosystem Restoration activities will lead to fuel reductions in the long term for the stand and the community but most operations with tree felling will lead to fuel accumulations that can pose hazards. The prescriber should consider one of 5 usual methods of fuel reduction:

d. Lop and scatter, light accumulations of fuels under 5 centimetres diameter can be spread about and a followup usual cool spring burn can flash the fuels off with little residue.

e. Lop scatter and rot of very light fuels in areas with little traffic and no upwind areas at risk may be feasible

f. Slash/ thin and skid all debris to a landing. If machinery can be used on site skidding all hogfuel, sawlog or pulpwood sized material to a landing can be more cost effective than slashing piling and burning. Most of this material can be sold locally to the forest industry. If access is poor and no commercial sale is possible the wood can be more easily burn roadside.

g. Masticating or chipping trees on site. A new methodology this promises o be cheaper and less problematic than slash pile and burn methods. The material is dealt with out smoke issues or retaining burns as a fire liability.

h. Slash pile and burn either in situ or in burning sloops. This has been the most common methodology but the piles often have to retained a year to burn properly which creates legal liability for the person cutting the trees. The burning, even with a sloop can damage soil and requires after burn grass seeding to prevent the spread of invasive plants. Overall the costs and risks can be high with this method. Sloops can increase the possibility of burning smokeless in tight weather windows but the need for venting

windows in fall and spring (winter has inversion) is a serious limitation to this methodology.

i. Monitoring protocol

iii. Intensive Monitoring: As per draft Routine Monitoring protocol. Fuel plots recording down and standing fuels are to be established including photo points. This is to build on existing data bases (FMA plus or Kamloops fuel plot index) and create a district data base of photo plots to allow burn bosses to predict fuel loading, fire behaviour and track the evolution of CWD and WTs. Plots are to be fed into fire behaviour prediction models (FMA plus and Prometheus) so as to expand our ability to predict fire behaviour.

iv. Routine Monitoring: Five photo plots per fire are to be revisited pre and post burn, data recorded for fuel reduction and vegetative response as per draft Routine Monitoring protocol. In areas of high interface values at least one of these plots must include a measurement of fuel before and after the burning or fuel reduction activities. Fire behaviour to be recorded during burns and this data fed into all other aspects of monitoring and research. Post fire evaluation plots are to be carried out on all fires within one growing season of ignition. Fuel loading is to be estimated pre and post fire by photo plots found in FMA plus and the Kamloops fuel plot index. On all project creating fuel hazards the “Wildland Urban Interface Wildfire Threat Worksheet” is to be completed after treatment completed and a copy kept on the opening file.

3.25 SMOKE MANAGEMENT:

Objective
1) Comply with smoke management regulations.

h. Legal Reference: Wildfire Regulation requires all possible man made fire hazards to be evaluated within three months of and for a professional to assess the fuel hazard. Open burning Regulation controls venting and air quality concerns. Ecosystem Restoration program will follow direction in regulation.

i. Measurable of fuel management;
i. All prescribers shall estimate potential smoke management hazards and risks in the prescription
ii. The risks and hazard shall be managed during prescribed burns considering venting indices and the *Open Burning Smoke Control Regulation*..

j. Discussion
i. Light up of prescribed burns or large amounts of piles debris requires a burn plan accepted by Ministry of Forests, Lands and Natural Resource Operations Wildfire Management Branch and under venting conditions set by Ministry of Environment *Open Burning Smoke Control Regulation*. This legislation requires that the burn come off safely, with minimal risk to public or private resources and that the smoke be vented away within 4 days of light up.
ii. Majority of prescribed burns are to be carried out by Ministry of Forests Lands and Natural Resource Operations district staff but Ecosystem Restoration Program shall reach out to contractors, other agencies and the Wildfire Management branch to increase capacity for burns in the narrow windows available.
iii. There has been problems in dealing with large amounts of piled debris from slash and pile operations; the problem is getting enough good venting days to comply with smoke control regulations. So far there are three methodologies of complying with the Open Burning Smoke control regulation:

d. Strict adherence with light up only on good days followed by good or fair days
e. Light of smaller amounts of piles per day as per the "Rocky Mountain and Columbia Forest Districts Interim Burn Plan for Management of Licensee and British Columbia Timber Sales Logging Slash Accumulations". This involves checking the smoke sensitivity areas and the ER areas are almost always high or moderate.
f. Create a prescribed burn plan for large amounts of accumulated slash and specifying conditions under which all the piles can be burnt. Often by spot forecasts, high wind conditions, test burns or

a full season of drying the debris can be burnt of with minimal smoke.

g. Monitoring protocol

v. Routine Monitoring: Five photo plots per fire are to be revisited pre and post burn, data recorded for fuel reduction and vegetative response as per draft Routine Monitoring protocol. Fire behaviour to be recorded during burn and this data fed into all other aspects of monitoring and research. Fuel loading is to be estimated pre and post fire by photo plots found in FMA plus and the Kamloops fuel plot index.

3.25 PROTECTION OF PUBLIC UTILITIES

Objective:
1 Carry out operations so as to minimize the risk of destroying or harming telephone lines, pipelines, public highways or power transmission lines..

A Legal reference: Utilities can be considered as Resource features as per section 70 of the *Forest Planning and Practices Regulation*, although they are not specifically mentioned as such in the Act. In general they are of value and should be protected.

e. Measurable The five year plan shall be referred to all known public utilities within the Rocky Mountain Trench. Recommendations from public utilities shall be reviewed and considered for incorporation into the Ecosystem Restoration Prescriptions.

f. Discussion

MINISTRY OF HIGHWAYS AND TRANSPORTATION
Ecosystem Restoration Program will follow the locally negotiated memorandum of understanding with the Ministry of Transportation and Highways regarding prescribed burns and Highways. A copy may be obtained from Dean Draper at the Ministry of Forests and Range Cranbrook office.

Construction / Timber Hauling
Rocky Mountain Trench primary contact at BC Hydro is Darcy Johnson (tel 250-489-6806, cell 250-919-7511) email darcy.johnson@bchydro.com Secondary Contact is Ian Kozicky (tel 250-489-6857 cell 250-417-7316) email l: Ian.Kozicky@bchydro.com

Vegetation / Timber harvesting Bill Laflin 250-489-8579 email William.Laflin@bchydro.com

These are parameters as to how Ecosystem Restoration can carry out tree thinning and burning operations around BC Hydro Transmission and distribution lines without impacting the operations of either agency. Our guidelines:

1) General Conditions:

- Do not park underneath hydro lines for any length of time; electrical discharge can occur. Parking, tying down loads, slash piles, decking / loading areas, etc are typically not allowed underneath the powerlines
- Equipment with extended reach or loads must use extreme caution when working near powerlines. At all times the 'Limits of Approach' must be obeyed. Do not work closer to the powerlines than the distances listed in the table below

- In certain situations, specific equipment may not be allowed to work within the powerline area
- Flagging guy wire locations and placing warning signs at all powerline crossing is also recommended
- Contact BC Hydro at least 3 days prior to any work commencing around the powerlines.
- Tree falling where trees have the potential to enter within the limits of approach must be fallen under the direction of a CUA. (Certified Utility Arborist)

- Review the WorkSafe BC publication "Overhead high-voltage electricity" and BC Hydro "High Voltage Systems" with all crews prior to start of work near lines.

- Tree falling near energized powerlines is referenced in WorkSafe BC Regulations Section 19 "Tree Pruning and Falling near Energized Conductors"

2) Tree felling

- All trees that can touch a line or come within the limits of approach should be identified .
- "Positive means of control" must be used to control tree direction of fall. This can be accomplished through proper roping, or proper mechanical falling. (combination of equipment and technique)
- Feller bunchers can be used for felling so long as they have control of the tree prior to cutting and can safely direct the trees away from the powerlines. Bunchers must be of the proper size for the size of tree and ground / slope conditions. Operators must be aware of and control the potential for breaking of tops during harvesting.
- Tree falling where trees have the potential to enter within the limits of approach must be fallen under the direction of a CUA. (Certified Utility Arborist)
- Use general crew to buck up trees and pile near the transmission line so long as operations do not encroach into the limits of approach.

The limits of approach to BC Hydro lines are:

General limits of approach (Table 19-1)

Voltage, phase to phase		Minimum distance	
Kilovolts	Volts	Metres	Feet
Over 750 V to 75 kV	Over 750 V to 75,000 V	3	10
Over 75 kV to 250 kV	Over 75,000 V to 250,000 V	4.5	15
Over 250 kV to 550			

- Remove all trees with 5 metres radius of any pole or anchor.
- There is to be no fuel build up on the right of way. No pile burning on or within 20 metres of the RW.

any trees within a 5m radius of any pole or anchor prior to the main burn

3) Tree hauling;

- Trees can be hauled on a right of way road, but this is site specific and MOFR must contact BC Hydro ahead of time for an evaluation. All BC Hydro roads to be used must be treated on an individual bases between BC Hydro and the contractor using the roads. A permission to use/construct form (PTC) will be filled out at that time.
- Dean Draper MOFR office Cranbrook has copies of forms (permission to Use or construct works within BC Hydro Transmission Lines Right of way) to be submitted to BC Hydro prior to any road building or hauling operations
- In general clearance between truck and line must be outside the "Limits of Approach".
- No new road or landing constriction with 10 metres of poles, guy wires or other transmission infrastructure

4) Prescribed Burning

- Water trucks and hoses can be used on the line; do not spray with Limits of Approach.
- The transmission poles are to be protected during a burn by raking, wrapping or black lining. Black lining is not limited to wood poles only, it must include the entire structure (i.e. Pole and guy wires)
- Do not spray or soak any pole or anchor without the permission of a BC Hydro representative. Use of water around Hydro poles is extremely dangerous and should be avoided.
- Black lining may be required along the ROW edge where there is an abundant amount of fuel adjacent to the ROW.
- A water truck must be on-site while any burning is underway
- No personnel or aircraft should spray or dump water or retardant on or near any BC Hydro plant (building) without previous permission or supervision of a BC Hydro representative
- It may be necessary to remove vegetation or other fuels prior to burning near a power pole or within the rights-of-way
- Burning onto the guard is permitted so long as infrastructure and other values are protected (e.g. a Christmas tree permit under the lines as per Eager Hills) Access road can make a fireguard, This is to be confirmed during planning stage by field inspection with BC Hydro
- The Burn Boss is to contact BC Hydro prior to light up and they will send a line man out to monitor the line (no cost to us).
- Good venting is needed for light up as smoke can cause arcing. Conditions which could allow for dense smoke within the power line rights-of-way should be

avoided as this could create a serious electrical hazard. In general remove all slash and debris from within 20 metres of a BC Hydro right of way.

- If MOFR has information about rare and endangered species, such as a Lewis' Woodpecker nesting in a Hydro pole, we are to pass this information onto Hydro so that they can do their due diligence in environmental protection.

TRANSCANADA PIPELINE

The main Trans Canada Pipeline contact for the Rocky Trench is Darren Mitchell, phone 529-7724 or cell 421-7348 email: darren_mitchell@transcanada.com

The general conditions are:

1) Trans Canada Pipelines do not want any debris, slash piles or log decks on their pipeline right of way.
2) Vehicles over 55,000 kilogram Gross vehicle weight (nothing over a 1 ton truck) should not be operating on the pipeline, although pick up truck and water trucks are acceptable.
3) Crossings of the pipeline should only be undertaken at existing crossings. If more crossings are required Tarns Canada Pipeline is to be contacted for the specifications required for the crossing construction.
4) A one time emergency crossing of the pipeline by a larger vehicle is possible. This intended to deal with environmental emergencies such as wildfire control or attacking an escaped prescribed burn.
5) Usually burning is not an issue around the pipeline but above ground structures such as pump houses may be at risk. As a precaution TransCanada Pipeline must be contacted prior to any prescribed burn being ignited adjacent to the pipeline. Even if there are no issues Trans Canada pipeline would appreciate being kept informed.

TELUS Telephone Lines

The main contact for TELUS is 1-800-474-6886 which only grants information about digging near TELUS underground lines or Trans Canada pipelines. For above ground powerlines contact Dave Bulford Cable Manager in Cranbrook at 250-489-8636 email dave.bulford@telus.com

Recommendations' are to protect the lines and power poles during operations, they do have the arcing potential of powerlines but the lines will not withstand much pressure and the poles have the same potential to burn as power poles. A fibre optic line runs under most telephone lines; assume there is one there for road or landing construction. Specific recommendations are:

1) During Tree felling ensure the trees are felled away from the line; a feller buncher or a certified faller is required. Do not fall trees onto the line.

2) Remove all trees with 5 metres radius of any pole or anchor.
3) There is to be no fuel build up on the right of way. No pile burning on or within 20 metres of the RW
4) In general heights over 4.02 metres should be avoided and a vertical distance of 4.5 metres should be maintained between vehicles and overhead lines.
5) No new road or landing constriction with 10 metres of poles, guy wires or other transmission infrastructure

d. Monitoring protocol. Ministry of Forests and Range will keep all records of any discussions or permissions for operations on five year plan file for future auditing and follow up.

3.26. PROTECTION OF RESEARCH TRIALS, GROWTH AND YIELD PLOTS, RANGE REFERENCE AREAS

Objective:
Carry out operations so as to minimize the risk of destroying or harming Research Trials, Growth and Yield Plots, Range Reference areas

A Legal reference: Research Trials, Growth and Yield Plots and Range reference Areas can be considered as Resource features as per section 70 of the *Forest Planning and Practices Regulation*, although the Government Action Regulation order for their protection did not go through. In general they are of value and should be protected.

- **g. Measurable:** Prescribers shall check the mapping layers available for occurrence of any of these features within a treatment area. Field crews as well must check for their occurrence. Actions must be prescribed to protect each feature.
- **h. Discussion**
- **i.** Discussion with Ministry of Forests and Range Inventory Branch shows that a 100 metre buffer is required around all growth a yield plots. Contact Bob MacDonald Growth and Yield Forester Southern Interior Forest Region, Ministry of Forests and Range, 1265 Dalhousie Drive, Kamloops BC Canada V2C 5Z5 telephone ((250) 371-5211 Facsimile: (250) 371-5293
- **j.** The Ministry of Forests and Range Research Branch prefers that all activities close (within 500 metres) to their active research site be referred to them for site specific conditions. In general nothing may be touched within the research plot area and buffering may be required on some specific projects. Fire guarded with reseeding may be an acceptable protection action. Contact Ryan Jordan, BC Ministry of Forests, Lands and Natural Resource Operations, Research Branch Kalamalka Research Station, Vernon BC voice 250-260-4760 fax 250-542-2230
- **k.** Range Reference areas are to be treated to treated the same within the fence line as without. The exclosures are tied to changes inside as outside and measure the effects of grazing on the plant community. Excluding the range exclosures from fire could confound the results. The fence posts are to reserved and protected from fire preferably by black lining, pre-soaking or foam. It is definitely not approved to expose mineral soil, and the attendant risk of invasive plants or other plant community changes near a range reference area. Contact Rick Tucker Range Agrologist, Ministry of Forests, Lands and Natural Resource Operations, Range Branch, Kamloops telephone 250-828-4141

Table 3.27.1 List of Growth and Yield Plots in Rocky Mountain Forest District Source: MOFR Research Branch, stored in Land and Resource Data Warehouse.

Growth & Yield SAMPLE Number	50K_Map sheet	LONG_	LAT	Area (ha)
18-26-23G	082F.120	116.0199	49.6149	0.8
18-1-64G	082G.102	115.2815	49.0547	0.8
18-2-94G	082G.102	115.5355	49.0270	0.8
18-2-95G	082G.102	115.5004	49.0305	0.8
18-2-96G	082G.102	115.4928	49.0521	0.8
18-17-3G	082G.106	115.9436	49.2633	7.2
18-17-4G	082G.106	115.9458	49.2621	7.2
18-17-5G	082G.106	115.8980	49.2696	7.2
18-17-6G	082G.106	115.8997	49.2691	7.2
18-17-50G	082G.106	115.9270	49.3058	7.2
18-17-51G	082G.106	115.9134	49.2966	7.2
18-9-34G	082G.107	115.3382	49.2400	0.8
18-21-14G	082G.111	115.8811	49.5449	7.2
18-22-1G	082G.111	115.9711	49.4615	7.2
18-22-2G	082G.111	115.9732	49.4622	7.2
18-22-3G	082G.111	115.9755	49.4630	7.2
18-22-25G	082G.111	115.9574	49.4311	7.2
18-26-22G	082G.111	115.9179	49.5639	7.2
19-21-7G	082G.113	115.0269	49.5803	0.8
21-3-12G	082G.121	115.6796	49.8380	0.8
21-6-10G	082G.121	115.8238	49.9749	0.8
21-7-100G	082G.121	115.8469	49.9789	0.8
21-6-9G	082G.121	115.7390	49.9701	7.2
21-28-80G	082J.103	115.1628	50.1693	0.8
21-28-84G	082J.107	115.3195	50.3469	0.8
21-28-86G	082J.107	115.3234	50.3501	0.8
21-26-56G	082J.107	115.4719	50.2114	7.2
21-28-78G	082J.107	115.2975	50.3187	7.2
21-28-83G	082J.107	115.2717	50.2495	0.8
21-17-50G	082K.119	116.4485	50.6434	7.2
21-17-51G	082K.119	116.4489	50.6446	7.2
21-17-57G	082K.120	116.3178	50.6315	7.2
21-17-58G	082K.120	116.3182	50.6308	7.2

Table 3.27.2 List of Research Trials in Rocky Mountain Forest District Source; MOFR Research Branch, stored in Land and Resource Data Warehouse.

Trial Number	Project_Title	Study_Site	50K Mapsheet	LONG_	LAT	Area (ha)
EP0670.71.06	Studies of Englemen Spruce Genetics	Lamb Creek	082F.110	116.0084	49.2574	2.4
EP1020.02.01.04	Western Larch Progeny Trials	Sawmill Creek	082F.115	116.0213	49.5650	4.4
EP1209.12	Skid Trail Rehabilitation Effects on Soil Properties and Resulting Forest Productivity	Bloom Creek	082G.102	115.4423	49.1168	1.0
EP1209.12	Skid Trail Rehabilitation Effects on Soil Properties and Resulting Forest Productivity	Caven Creek	082G.102	115.4836	49.1771	0.9
EP0670.02.03.02	Genetic Improvement of Interior Spruce	Bloom Creek Site 1 & 2	082G.102	115.4519	49.0144	3.6
EP0670.02.03.19	Genetic Improvement of Interior Spruce	Roche Creek Site 1 & 2	082G.105	114.3101	49.1812	2.8
EP1020.02.01.03	Western Larch Progeny Trials	Semlin Creek	082G.106	115.9639	49.3918	4.4
EP1020.02.01.02	Western Larch Progeny Trials	Lamb Creek	082G.106	115.8503	49.3577	12.2
EP1020.02.03.02	Western Larch Progeny Trials	Upper Lamb Creek	082G.106	115.8612	49.3350	3.2
EP0670.02.03.31	Genetic Improvement of Interior Spruce	Gold Hill Creek Site 2	082G.106	115.8995	49.3282	1.8
EP0670.02.03.21	Genetic Improvement of Interior Spruce	Lamb Creek Site 2	082G.106	115.8733	49.3376	3.3
EP1209.05	Longterm soil productivity - rehabbed landing	Tait Creek Block 1	082G.106	115.8806	49.3293	0.8
EP1209.05	Longterm soil productivity - rehabbed landing	Tait Creek Block 2	082G.106	115.8756	49.3260	0.8
EP0670.02.03.01	Genetic Improvement of Interior Spruce	Lamb Creek Site 1	082G.106	115.8664	49.3393	2.0
EP0886.01.12	Fertilization Trials in the BC Interior	Gold Creek	082G.107	115.4992	49.3161	15.1
EP0886.01.04	Fertilization Trials in the BC Interior	Gold Creek	082G.107	115.5325	49.3085	27.7
EP0886.01.47	Fertilization Trials in the BC Interior	Teepee Creek	082G.107	115.5325	49.3121	27.6
EP1020.02.03.04	Western Larch Progeny Trials	Semlin Creek 95	082G.111	115.9544	49.4105	2.8
EP0511.01	Crop-tree thinning of Western Larch	Perry Creek	082G.111	115.9171	49.5694	12.4
EP0670.71.12.05	White/Engelman Spruce Genecology Climate Change Trial	Cranbrook	082G.111	115.9586	49.4103	1.9
EP0657.03	Exploratory studies with 30 Lodgepole pine provenances	Negro Creek	082G.111	115.9532	49.4238	11.8
EP0657.06	All range lodgepole pine provenance trials	Wuho Creek	082G.111	115.9506	49.4541	6.6
EP0976.02.08.04	Interior Douglas-fir Progeny Trials	Lumberton	082G.111	115.9054	49.4315	4.9
EP0670.02.04.02	Second Generation Breed Production Trial	Bull River	082G.112	115.4572	49.4655	3.6
EP1365	Residual Basal Area Study in a	St Marys East	082G.116	115.9765	49.6212	6.4

	mixed conifer stand					
EP1365	Residual Basal Area Study in a mixed conifer stand	St Marys Centre	082G.116	115.9860	49.6273	8.4
EP0607.01	Ponderosa Pine Spacing Trials	Cherry Creek	082G.116	115.8404	49.6943	3.0
EP1333	Monitoring Restoration of Fire-Maintained Ecosystem	Sheep Creek North	082G.121	115.6989	49.9866	396.9
EP1333	Monitoring Restoration of Fire-Maintained Ecosystem	Wolf Creek	082G.121	115.6958	49.8432	154.6
EP0770.20.20.03	Lodgepole pine OP/full-sib progeny testing	Pommier Creek	082G.121	115.8417	49.8795	2.4
EP1209.12	Skid Trail Rehabilitation Effects on Soil Properties and Resulting Forest Productivity	Grave Creek Site 1	082J.102	115.3003	50.1931	1.7
EP0670.02.04.03	Second Generation Breed Production Trial	WhiteSwan Lake	082J.102	115.4593	50.1576	2.7
EP0670.02.03.17	Genetic Improvement of Interior Spruce	Grave Creek Site 1 & 2	082J.102	115.2961	50.1929	4.1
EP0670.02.03.13	Genetic Improvement of Interior Spruce	East White River Site 1	082J.103	115.1092	50.1512	1.8
EP0670.02.03.22	Genetic Improvement of Interior Spruce	East White River Site 2	082J.103	115.1080	50.1502	1.7
EP1209.12	Skid Trail Rehabilitation Effects on Soil Properties and Resulting Forest Productivity	Grave Creek Site 2	082J.107	115.3093	50.2034	1.7
EP0886.01.39	Fertilization Trials in the BC Interior	South Jack Creek	082J.107	115.4825	50.2647	9.1
EP0657.06	All range lodgepole pine provenance trials	Elk Creek	082J.107	115.4663	50.2517	6.4
EP0670.02.03.07	Genetic Improvement of Interior Spruce	Horsethief Creek Site 1	082K.114	116.5529	50.5180	1.8
EP0670.02.03.15	Genetic Improvement of Interior Spruce	Horsethief Creek Site 2	082K.114	116.5546	50.5159	1.7
EP0922.07	Juvenile Spacing Trials	Driftwood Creek	082K.124	116.5862	50.9196	5.1
EP1209.12	Skid Trail Rehabilitation Effects on Soil Properties and Resulting Forest Productivity	McMurdo Creek	082N.103	117.0936	51.1227	8.5

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Kootenay Boundary Higher Level Plan, including Kootenay Boundary Land Use Plan Implementation Strategy: srmwww.gov.bc.ca/kor/hlp/main.htm

Species and ecosystems at risk in BC: www.env.gov.bc.ca/wld/serisk.htm

Ungulate winter ranges in BC: www.env.gov.bc.ca/wld/uwr/index.html

Wildlife Habitat Areas: http://www.env.gov.bc.ca/cgi-bin/apps/faw/wharesult.cgi?search=wlap_region&wlap=Kootenay

ABBREVIATIONS USED IN THE TEXT

AAC allowable annual cut
cm centimeter (1 cm = .394 inch)
CORE Commission on Resources & Environment
EKTAWC East Kootenay Trench Agriculture/Wildlife Committee
Ecosystem Restoration fire-maintained ecosystem restoration
(*range*, *rangeland*, *open range*, *grassland*, *open forest*, *savanna* and *NDT4* are used interchangeably to identify the ecosystems being restored)
ha hectare (1 ha = 2.471 acres)
kg kilogram (1 kg = 2.205 pounds)
km kilometre (1 km = .621 mile)
KBLUPIS Kootenay Boundary Land Use Plan Implementation Strategy

m3 cubic metre
NDT4 Natural Disturbance Type 4
RMFD Rocky Mountain Forest

Appendix I Business Processes of Ecosystem Restoration

Appendix II example of Ecosystem Restoration Prescription

ECOSYSTEM RESTORATION PRESCRIPTION

Rocky Mountain Forest District

☒ Single ☐ multi-area

AREA IDENTIFIER: OPENING NO.; 82J011-142 (was25, 26, 27, 28, 46, 47, 86) Location: Thunder Bob Pasture	☐ ORIGINAL ☒ AMENDMENT #3	DATE Y / M / D 2011/11/23

A. GENERAL DESCRIPTION OF AREA

SU	TU	Treatment Regime	Gross Area (ha)	Reserve/ No Treat Area (ha)	NP Area (ha)	Net TREATMENT AREA (ha)
OR	A	Open Range/ Prescribed Burn as is	191.86	0	2.92	188.94
OF	B	Open Forest / Slash/ Pile Burn / Prescribed burn	37.92	0	0.32	37.6
OR	C	Open Forest / Slash/ Prescribed burn	23.47	0	3.2	20.27
OR	D	Open Range / Slash / Pile burn	50.78		4.16	46.62
OR	E	Open Range / No treatment	30.39	0	0.36	30.03
MF	F	Managed Forest / Harvest at future date	41	0	0	41
OF	2	Open Forest / Slash/ Pile Burn / Prescribed burn	3.73	0	0.15	3.58
OF	X	Open Forest / Slash/ Pile Burn / Prescribed burn	39.41	0	0.6	38.81
OF	Y	Open Forest / Slash/ Pile Burn / Prescribed burn	27.29	0	2.7	24.59
OF	Z	Open Forest / Slash/ Pile Burn / Prescribed burn	77.82	0	0	77.82
WTP	WTP all	Reserve	33.91	33.91	0	0
		Totals	557.58	33.91	14.41	509.26

FIELD WORK BY: D Barnes, J Galandar Grant Neville, John Brace, Ryan Fuessel, R Harris	DATE COMPLETED: June 10, 2009; Field work June 3, 2009 and November 2008 and July 2011	TOTAL TREATMENT AREA 435.4 TO PRESCRIBED BURN (ha)

B. HIGHER-LEVEL PLANS

ARE THESE TREATMENT AREAS WITHIN LOCAL RESOURCE USE, TOTAL RESOURCE, INTEGRATED WATERSHED MANAGEMENT, OR OTHER SPECIFIC PLANNING AREAS? X NO

ARE ANY OF THESE TREATMENT AREAS WITHIN A COMMUNITY WATERSHED? ☐ YES ☒ NO

SU number:

IF YES:	PLAN NAME
	Kootenay Boundary Land Use Plan, Ungulate Winter Range Orders U-4-008 Invermere. An approved Stand Management Prescription (SMP) including openings 82J011-025, 026, 027, 028, 046, 047 and 086 dated January 3, 2001 is on file. This Ecosystem Restoration Prescription (ERP) revises the SMP boundaries to include areas not included in the original prescription and to modify the treatment units within the original SMP. The original prescription shows free to grow status for portions of the block although some openings are pre-1987 obligations and are not declared FG. Unit is covered by a draft Memorandum of Understanding outlining the joint management of the Dutch Findlay and Findlay Basin Range Units between the Rocky Mountain Trench Ecosystem Restoration Program, The Nature Trust, The Nature Conservancy of Canada and Thunderhill Ranch.
IF NO:	CONSULT WITH OTHER RESOURCE AGENCIES TO ASSIST IN DEVELOPING MANAGEMENT OBJECTIVES FOR THE PRESCRIPTION.

SUMMARY OF HIGHER-LEVEL OBJECTIVES FOR THESE TREATMENT AREAS (Please rank specific objectives *[1 = highest priority, 10 = lowest]*):

(6) Timber (2) Range ( ) Recreation ( ) VQO (1) Wildlife Habitat (3) Biodiversity (4) Wildlife Trees ( ) Fisheries (5) Water Quality ( ) Other:

C. STAND-LEVEL OBJECTIVES

ARE CURRENT STAND-LEVEL OBJECTIVES AVAILABLE FROM SILVICULTURE PRESCRIPTIONS? ☐Yes ☒No IF 'YES,'.	
ARE CURRENT STAND-LEVEL OBJECTIVES STILL APPROPRIATE FOR THESE STANDS? No ☐NA	
USE THIS SECTION TO SUMMARIZE OBJECTIVES FROM HIGHER-LEVEL PLANS OR FOR DEVELOPING OR CLARIFYING STAND-LEVEL OBJECTIVES.	
TIMBER	MANAGEMENT OBJECTIVES
SU All	**2.** Open Range stands are to maintain 0-75 stems/ha on site with a target of 20 stems/ha while maintaining largest trees on site emphasizing trees greater than 30cm DBH. Open Range areas will not be managed for timber production. Repeated low intensity fire is intended to perpetuate an open landscape and fire proof the ponderosa pine stems to allow them to emulate old growth characteristics. **3.** Open Forest stands are to maintain 76 to 400 stems/ha on sites with a target of 150 stems/ha while maintaining largest trees on site emphasizing trees greater than 30cm DBH. One third of trees retained are to be from largest diameter class present on site. **4.** Open Forest stands shall produce 50% of their volume potential, this half production is estimated to be 70 m3/ha in a 100 year rotation. No merchantable volume is expected from Open Range stands.
SU 2	This SU TU B, 2, X, Y and Z will be managed as a mosaic of open range to open forest following spacing and broadcast burning. This treatment will focus on shifting the species composition from dominant dense Douglas-fir to a mix of Ponderosa pine and western larch with a minor amount of Douglas-fir. Given the financial investment in silvicultural activities and the age of stems, managed stands will be allowed to grow through to an early rotation when the volume will be removed and this SU will be managed as open forest. Pruned trees will not be slashed although they may be under burned.

A large portion of this prescription area was burnt by the Spen fire in 1985 while other portions were logged in 1962, 1968 and 1979. There has been extensive silvicultural activity and investment in openings within this treatment area. Management of silviculture treatment areas will favour carrying these stands through to early rotation to when they will be harvested to recover the investment. Slashing will remove suppressed stems which will improve tree growth similar to a pre commercial thinning. Given the species, tree diameters, branching pattern and fact that these plantations survived the 1985 wildfire, the plantations should not be significantly impacted by the prescribed burning.

Openings 82J011-27 and 46 were planted in 1968 and 1962 respectively with Py. This plantation extends across the Findlay FSR. The majority of planted Py in opening 27 were not damaged or destroyed during the 1985 fire while some mortality occurred in opening 46. Juvenile spacing occurred in openings 82J011-46 and 86. Free growing status has been declared on openings 82J011-25, 27 and 47 while openings 26, 28 46 and 86 are not FG. As spacing and pruning occurred in some of these areas, the average diameters should exceed the cutting specifications given to work crews.

Dispersed areas of Managed Forest stands will remain following the treatment and may contribute to a higher overall future volume potential in conjunction with Open Forest stands. The Managed Forest stands will result where established trees have grown enough to warrant continued management for timber production with the expectation they will be removed when stand volumes reach sufficient economic levels for harvest in approximately 30 to 40 years. Following the next harvest pass, managed forest stands densities should be reduced to open forest.

Thinning the majority of stems < 15 cm dbh. Burning is required to establish target stocking standards. TU A and B will be broadcast burned while TU C and D will be piled and burned. TU E will not be treated.

This prescription is consistent with the original SMP.

Slashing is required in TU's B, C and D. Slash will be piled and those piles burned. TU A and B will be broadcast burned. TU E will not be slashed or burned but is included in this prescription to specify management regimes.

UNDERSTORY (Grasses, Forbs, Shrubs)	MANAGEMENT OBJECTIVES

SU All	1. Increase the native grass and forb plant cover by 25% within ten years of initial burn treatment. Initially, until better inventory data is available, the rough fescue/ Idaho fescue/ blue bunch wheatgrass is to be used as the default community to be increased. Measurement of the increase shall be determined by photo plots taken during routine monitoring that will be calibrated by effectiveness monitoring plots where actual measurements will be taken. 2. Increase the forage biomass of valuable decreaser (e.g. Saskatoon berry, rose spp., ceanothus, chokecherry) shrubs by 25% cover in treated areas within 5 years.
Monitor by photo plots taken before and after the prescribed burn. There is a very healthy and dense layer of Soopallallie and Aspen regeneration in SU B, 2, X, Y and Z.	

Riparian; streams, wetlands Lakes and Fisheries

MANAGEMENT OBJECTIVES

1. All streams, wetlands and lakes shall be identified and classified in the Ecosystem Restoration Prescription for each treatment area as per Forest Practices Code Stream Classification Guidebook and Riparian Management Guidebook.
2. Management within each riparian management area shall follow the best management practices contained in the Riparian Management Guidebook; namely:
   - ❑ Retain all under story shrubs and suppressed and intermediate trees in all Riparian Management Areas.
   - ❑ Retain all dominant and co-dominant trees in all Riparian Reserve Zones, except where provisions of FRPA require harvest. (i.e. safety or road construction)
   - ❑ If tree removal is required on any section of the Riparian Management Zones, Ecosystem Restoration Prescription will retain dominant and co-dominant trees but on average each Logical Burn Unit will maintain retention levels as per tables 3.3.1, 3.3.2 and 3.3.3:
   - ❑ Natural drainage pattern shall be maintained for classified and non classified drainages.

TU	Stream or wetland class	Riparian Reserve zone width (m)	Riparian management zone width(m)	Retention strategy
A	W3	0	30	Retain a minimum 40 % of windfirm and 10 % overall of dominant and co-dominant trees within RMZ's
E	W1	10	40	Retain a minimum 40 % of windfirm and 10 % overall of dominant and co-dominant trees within RMZ's
F	L1B	10	0	Retain a minimum 25 % of dominant and co-dominant trees with RMA's

Two smaller wetland areas are located within TU A. One is approx. 1.5 ha in size while the other is < 1ha. These features fall within the existing open range and no special management strategies are required. There exists trampling and browsing impacts around the water feature in the west of TU A. Smaller wetland features in this SU will be incorporated into WTPs . They will be allowed to burn or not burn as would occur naturally in a natural fire.

Community WATERSHED	MANAGEMENT OBJECTIVES
SU All	1. Ecosystem Restoration Program shall abide by watershed assessments created for any consumptive use or community watershed in the NDT4 area. 2. Ecosystem Restoration program will control sediment through out project areas by grass seeding exposed mineral soil within one growing season of disturbance, carry out no soil disturbance works within 100 metres upstream of all consumptive water intakes and take care to damage no water works infrastructure. 3. The Ecosystem Restoration Program shall query government databases prior to treatment of site to see if there are down stream domestic water intakes as per map 6.1. 4. Increased level will be decided on a stand level basis but will exceed the average targets suggested in riparian section.

There are seasonal surface streams in this block but there is no evidence that there is a direct connection to any consumptive water use water intakes. Mapping records no water intakes on Findlay Creek where the lay of the land indicates this block would drain into. Several NCD's flow into Stinky slough as the main catchment area within this prescription area.

Two water intakes were noted in the vicinity of this treatment area but both are located outside the prescription area. The intake on Nelson Brook is held by Lawrence Greenlaw for domestic use and irrigation. The intake is located greater than 100m from the treatment area boundary and there is no overland connection as the streams do not fall within any TU. The north boundary of TU D is the slope break above Nelson Brook. This TU will be slashed and piled. Only the piles will be burned so activities are not expected to adversely impact water quality.

An intake is identified on Meadow creek for both domestic use and irrigation. There is no overland connection and Findlay FSR seperates the treatment area from the intake. Activities are not expected to adversely impact water quality.

Water licence holders will be notified prior to prescribed burning directly or through public advertisement of the prescribed fire.

STAND LEVEL BIODIVERSITY (WT and CWD)	MANAGEMENT OBJECTIVES
SU All	1. ER Program shall maintain the Old Growth Management Areas as laid out by Integrated Land Management Bureau in 2006, and will thin and burn them only to maintain function and stand health. 2. Treatment will maintain and recruit 2 to 10 wildlife trees (over 30cm DBH, 40cm preferred) per hectare through out treatment cycle on open forest treated area. Tree species in descending order of preference are Ponderosa Pine, Western Larch, Douglas-fir, Trembling Aspen and Black Cottonwood (the latter if available). 3. Patches of snags and live trees will be in patches of .1 to 1.0 hectares rather than even distribution so as to proximate the natural occurrence of skips after a wildfire and located so as to approximate the areas likely to be unburnt after a light intensity fire. They shall meet retention targets as per table 3.9 in FSP. 4. Maintain and recruit 3 cubic metres of CWD (over 30cm DBH and all rot stages not just sawlog grade) per hectare through out treatment cycle on the treated area. Number and distribution shall, at least, meet minimums set by FPPR namely as minimum of 4 logs per hectare, greater than 5 metres long and 7.5cm diameter at small end.

1. No OGMAS are noted in this prescription area.
2. Wildlife trees and patches have been established in the prescription area (See attached spreadsheet for detailed description) . The candidate trees and areas were selected based on desirable attributes identified. There will be natural patches of dense forest in the gullies and wetlands in all SU's. Mature trees are expected to be maintained in all SU's. All immature trees within 3 metres of WTP's should be slashed, piled and burned to create a fuel free area around all WTPs.
3. As the red and blue listed session up to 200 snags can be created in this block by piling debris at the base of the tree and other snags made be recruited on site by heart rot inoculation.
4. Due to the severity of the 1985 Spen fire there is virtually no Coarse Woody Debris on site and with limited tree regrowth there is no opportunity to meet the minimum Coarse Woody Debris standards on this block. Where feasible, CWD material will result from leaving to 2 to 4 piles per hectare unburnt and at least 30 metres from roads or fences lines.
5. Vegetation at the base of high value wildlife trees as defined in Section 5 of GENERAL GUIDELINES for LAYING OUT WILDLIFE TREE PATCHES AND BIODIVERSITY PATCHES (attached) should be removed to create a mineral soil guard to protect the wildlife tree prior to burning operations.

SPECIES AT RISK	MANAGEMENT OBJECTIVES
SU All	1. Prior to any Ecosystem Restoration prescription being prepared the prescriber shall check the CDC database for occurrence of red and blue listed species and the Ministry of Environment website for WHAs in the area prescribed for treatment. 2. All Prescriptions within a WHA shall follow the general wildlife measures or an exemption shall be asked for with rationale.

Lewis' Woodpeckers WHA 4-002 has been established to the north of this prescription area. There are two areas proposed as WHA's for Lewis Woodpecker. The new WHA's would be 4-134 and 4-135. WHA 4-135 would partially fall within TU C.

Three courses of action will be followed for snag habitat management for Lewis's' Woodpecker; retention, recruitment and inoculation.

Retention – Activities will comply with the general wildlife measures and high value snags will be saved. To reduce the potential for escape in WHA 4-002 on the north boundary and to reduce the impact on snags in TU C and in the proposed 4-135, slashing debris will be piled away from existing snags in TU C and burnt under suitable conditions prior to the broadcast burn.
Recruitment - New snags maybe recruited in the other TU's to replace snags currently falling out of the stand in the existing and proposed WHA's. Approximately 200 snags will be recruited by piling spacing slash at the base of large diameter Py and Fdi to generate sufficient fire intensity to induce fire mortality.
Inoculation – Snags may be created through the introduction of inoculum in the bole of suitable trees.

Wildlife Habitat Areas 4-102 for Yellow badger occurs to the west of this block and does not fall within this prescription area. General Wildlife measures associated with the yellow badger WHA orders requests that harvest in these areas be designed to speed ecosystem restoration. That is the intent of this prescription. As this WHA is located outside of this prescription area, no machinery will be operated inside the WHA under this prescription so no survey for natal dens will be undertaken.

Rare Plant Species or Plant Community	MANAGEMENT OBJECTIVES
SU All	Prior to any Ecosystem Restoration prescription being prepared the prescriber shall check the CDC database for occurrence of red and blue listed plants or Ecological Communities in the area prescribed for treatment. Best management practices are to be followed to manage for the species.

None noted in block area in field or the Conservation Data Centre map layers.

UNGULATE CONCERNS	MANAGEMENT OBJECTIVES
SU All	The Ecosystem Restoration program shall follow the direction of Ungulate Winter Range (UWR) Orders, which will meet the habitat requirement of ungulates on site.

Mapping provided by the Ministry of Environment shows this area to be class 2 to 4 winter range for elk, class 3 to 4 mule and whitetail deer (draws and wetter site fall to class 3) , class 5 for moose, class 5 for Mountain goat, and class 6 for Bighorn Sheep. Keeping this stand open will provide more forage for all three featured species (elk, mule deer and white tail deer).

FOREST HEALTH	MANAGEMENT OBJECTIVES
SU All	1. Keep root rot incidence to less than 8% of stand affected based on ocular estimates undertaken during routine monitoring surveys of the ER blocks. 2. Action 50% of all Mountain Pine Beetle infestations within one year of detection, as per the District Forest Health Strategy. Action may not necessarily be taken by ER program due to forest licensing constraints.

Mountain Pine beetle have caused mortality in a high percentage of Pli within the prescription area however Pli is a minor component of the stand composition. Remaining volume is minimal and no special action is required. Red attack noted in the WTP in TU B and those attacked trees may be felled and burned. No root rot noted.

INVASIVE PLANTS	MANAGEMENT OBJECTIVES
SU All	Invasive plant infestations of priority species should not increase from those recorded by the Ministry of Forests and Range, Range Branch for the Range Unit being treated. The Invasive Alien Plants (AIP) application website shall be consulted prior to the writing of any prescription and the invasive plant species found on site shall be noted and infestations forwarded to the East Kootenay Invasive Plant Program Committee (or its successor).

There are heavy occurrences of spotted and diffuse knapweed on the Findlay FSR, the power line access road and within the treatment area on secondary roads and trails. Spotted and diffuse knapweed noted on access roads will be treated by East Kootenay Invasive Plant Committee.

Any soil exposed as a result of ER treatment shall be revegetated within one year of disturbance. Fire guards will be along existing roads and trails.

RECREATION	FEATURE SIGNIFICANCE	
KEY FEATURE	grasslands	MANAGEMENT CLASS
SU All	MANAGEMENT OBJECTIVES:	

	ER program shall manage consistent with the objectives for any recreation sites or trails falling with the NDT4 area and act in concert with the District Recreation Officer.

No recreation sites or trails in this block. Findlay Falls Trail in on Findlay River on the south side of TU B. The Findlay FSR will act as the southern fireguard. No impacts are expected. Public will be notified prior to broadcast burning.

ACCESS	MANAGEMENT OBJECTIVES:
SU All	1. Access control is to be considered in each prescription and appropriate action prescribed and implemented. Actions are to be documented and kept on Opening or Ecosystem Restoration Plan files. 2. Ecosystem Restoration Program shall be consistent with declared access management orders issued under the Wildlife and Forest and Range Practices Acts.

1. Block is covered by a Wildlife Act Access restriction order. The area has a closure between May 1 and November 30. Trails and roads cross much of the prescription area. The area can be accessed by the Hydro right-of-way. No new road construction is planned and bladed fireguards will only be established on existing trails or roads.

Visual Quality Objectives (VQO)	LANDSCAPE SENSITIVITY	VISUAL QUALITY OBJECTIVE Entire area is visible. Modification and Partial retention

SU	MANAGEMENT OBJECTIVES
All	All tree harvesting prescriptions should meet existing declared visual quality objectives (VQO) due to retention strategies of Ecosystem Restoration program.

As this ER treatment will retain trees and recreate a historic mosaic of grasslands and treed grasslands, it will not impact the existing viewscape or fail to meet partial retention VQO.

ARCHAEOLOGICAL	Archaeological Assessment Required? Yes polygon 112-94, 112-95, 112-90, 112-96, 112-97 and 112-113 Completed? No

SU All	
	1. All ER Prescriptions that overlay medium to high potential archaeological polygons will be considered for examination by an archaeologist acceptable to First Nations and recommendations for treatments (e.g. avoidance, treat only under sufficient snow pack) will be discussed with the archaeologist and incorporated into the ER Prescription. 2. Further to 1 above an archaeological assessment shall be completed for any ER operation that requires the exposure of earth (i.e. the constriction of new road, landing, fireguard or reopening an existing road) within a medium to high archaeological polygon prior to work commencing. Operations shall respect the recommendations of the assessment.

Fireguards will be restricted to existing trails or roads but many of the proposed sections fall within potential archaeological polygons. An archaeological field reconnaissance will be required for the proposed fire guards.

Note that an archaeological field reconnaissance was completed on the north boundary of TU D in 2009, amendment #2 dated September 8, 2009. The guard around Stinky Slough can be built but there is to be no upgrading on the road bisecting TU D.

Consultation with First Nations regarding entire Ecosystem Restoration program occurred in 2009 and 2010. No comments specific to this block were received.

CULTURAL AND HERITAGE CONCERNS	MANAGEMENT OBJECTIVES
SU All	ER prescribers shall note, in the ER prescription the occurrence of plant species noted by experts as being "cultural keystone species". The current list is blue camas, bitter root, Soopallalie, Saskatoon berry.

Reburning this site should reinvigorate the healthy copses of Soopallalie and Saskatoon on site.

RANGE	CATTLE USE? ☒Yes ☐No	IF 'YES,' RANGE UNIT: Dutch Findlay	PASTURE: Stinky
RANGE IMPROVEMENTS CATTTLE PRIMARYACCESS TRAILS? ☒Yes ☐No		IF 'YES,' LOCATE ON ATTACHED MAP	SEEDED? ☐Yes ☒No

SU	MANAGEMENT OBJECTIVES
All	1) Improve forage quality and quantity. 2) ER program shall not open up closed forests that would change the distribution of cattle (i.e. not remove natural barriers) and shall ensure that any fence damaged by ER practices is repaired to acceptable standard.

No harvest or removal of natural barriers is proposed under this prescription. Treatment will improve forage on site. Roads and trails noted on prescription map will be kept clear of slash. Fence line shall be protected it from destruction in a prescribed burn. All fuel within 3 meters of the fence lines should be piled and burned.

PRESCRIBED BURN	MANAGEMENT OBJECTIVES Rank 3 burn during initial prescribed burn and a rank 2 burn during maintenance burns. Rank 3 burns have rate of spread of 1.5 to 3 metres per minute, with 2 metre high flames and an organised front and may display candling. Rank 2 fires spread at less than 1.5 metre per minute with a disorganised head and virtually no candling.
SU All	**Measurable of maintenance burn**; a. kill 80% of trees under 3 metre tall, b. maintain seed bank and nutrients by creating a moderate fire over 75% of the burn area as determined by a post fire evaluation using the US National Parks Service Fire monitoring Handbook FMH 21 And FMH 22 criteria. (National Parks Service, 2003) c. time the burn to avoid killing grass growing points, d. do not burn more than 10% of pole and co-dominant trees (need 5% for recruitment as WT and CWD), e. cover 75% of area with burn, f. lift live canopy to 1.5 metres g. Rejuvenate shrubs

TU's A and B will broadcast burned. TU C and D will have the piles burned prior to the broadcast burn to provide depth and defend to protect the WHA to the north and private land to the east. TU E will not be burned.

Fire may be allowed to creep into TU C and TU D but it should be actioned as soon as practicable to reduce its spread. Fire should not be allowed to enter TU E and F should be actioned and extinguished as soon as possible.

This shall be a maintenance burn, fence lines to be protected, slashing of trees within 3 metres of fence line to be carried out prior to light up.

WTP's will have 3 meter fuel free buffers established around their perimeter but fire will be allowed to burn or not burn the area as would a natural fire.

Fireguards:

Eastern - A hydro power line is adjacent to much of this prescription area and the right-of-way serves as the eastern fireguard. Crews will follow the Standard Operating Procedures for ER Projects Conducted Near Public Utilities (see attached) Fuels should be removed and piled to the west of the hydro line. The hydro line intersects Findlay FSR. A fireguard will need to be bladed along an old non-status forestry road around Stinky slough to exclude it from the broadcast burn.

Northern- An existing non-status road will need to be re-bladed between TU A and TU C to act as a fireguard.

Western – The NW fireguard will be a non-status forestry road which will require re-blading. It will link up with a newly bladed guard (2009) from the water hole to the Findlay FSR.

Southern – Findlay FSR – no action required.

TU C will not be broadcast burned to protect existing cavity nests. It will be slashed and debris will be piled and burned before the broadcast burn. It will provide a "depth and defend" buffer to protect the WHA just north of the prescription area.

TU D will be slashed and piled and burned prior to broadcast burning. This area will provide greater depth and defend area between the broadcast area and private land and water intakes.

Fireguards will need to be bladed prior to burning. Archaeological assessments have been completed see archaeological section. The guard along the western boundary has been established and may require refreshening.

Contact BC Hydro, MoTI, local residents Canal Flats sawmill prior to burn operations.

Private land owners to the east of TU E should be contacted prior to broadcast burning operations.

Smoke management may require special actions along highway 93/95 such as signage, flag persons or a pilot car.

Fuel Management	MANAGEMENT OBJECTIVES

SU All	1. All prescribers shall estimate potential fuel loading, potential hazard and risks in he prescription 2. The risks, loading and hazard shall be re examined on completion of activities 3. Methodology of hazard abatement and assessment of risk shall be recorded on opening file end forwarded to Wildfire Management branch
Smoke Management	MANAGEMENT OBJECTIVES
SU All	1. Prescriber shall outline smoe control issue for information of burn plan and operations on site.
OTHER RESOURCE VALUES/INTERESTS (Public Utlities, research plots etc.)	MANAGEMENT OBJECTIVES
TU All	Private land exists to the east of TU D. The private land owner has expressed concerns and Randy Harris has been in contact with him (See file note) Private land owners will be contacted prior to broadcast burning. Thunder Hill Provincial Park is north of the prescription area. It is no longer active and should not be affected by treatment activities.
TU All	Highway safety and smoke management concerns will be addressed in the burn plan given the proximity to Canal Flats and Highway 93/95.
TU All	Public Utilities: A Hydro transmission line bisects this prescription area and it will be used as the eastern fireguard. An underground gas line is identified on the map although no above ground pump stations were found within the prescription area. Activities will follow the attached Standard Operating Procedure for Ecosystem Restoration Projects conducted near Public utilities.
Several mineral tenures are located within the prescription area. The tenure identifiers are: 590749, 581780, 601883, 581780 and 601880. Available information on the tenure holder from the ILRR is attached. Reasonable efforts should made to contact them prior to burning operations.	

D. PRESCRIPTION APPROVAL		
PREPARATION		PRESCRIPTION REVIEW
PREPARED BY *(SIGNATURE / SEAL-RPF)*		MINISTRY OFFICIAL *(SIGNATURE)*
PRINTED NAME BJ Randall Harris RPF #2609	DATE SUBMITTED Y / M / D 2009/06/23	DATE REVIEWED Y / M / D
LICENSEE SIGNING AUTHORITY		FINAL APPROVAL
I certify that the work described herein fulfills the standards expected of a member of the Association of British Columbia Forest Professionals and that I did personally supervise the work. * SIGNATURE		**District Manager: Approval: Approval given under Section 52.1(b) of the Forest and Range Practices Act authourity when 5 year plan was approved** *(SIGNATURE)*
PRINTED NAME	DATE SIGNED Y / M / D	DATE APPROVED Y / M / D

FS68 HFP 98/6

- May be mandatory if activity part of license agreement

TREATMENT UNIT (TU) DESCRIPTION

Use this page to record appropriate treatment area(s) information by Standards Unit

E. AREA DESCRIPTION

SU	TU	BEC ZONE	DISTINCT MAPPABLE SITE SERIES			NON-MAPPABLE SITE SERIES COMPLEX			MANAGE AS
			SITE SERIES	SMR/SNR	% OF SU	SITE SERIES (% composition)	SMR/SNR	% OF SU	
OR	A/C	IDFdm2	3 1 4	3-4/C	20 70 10	raws are subhygric-aspen-osier dogwood			)Fdm2 EA 1 Open Range
OF	3, 2, X, Y, Z	IDFdm2	3 1 4	3-4/C	10 70 20	Small dispersed aspen patches			Open Forest
OR	D/E	IDFdm2	1 3	3/C	70 10	Small dispersed aspen patches			Open Range
MF	F	IDFdm2	4 5	5/C	80 20	Approaches 05 by Stinky Slough			Managed Forest

Note TU C was not sampled in the field. Description interpolated from approved SMP and other survey information. Soil and topography similar to field data collected for TU A. TU E will not be slashed.

SU	TU	SLOPE (%) DOMINANT (RANGE)	LENGTH & UNIFORMITY	ASPECT	MESO-SLOPE POSITION	ELEVATION (m) min	ELEVATION (m) max
OR	A/C	10 (0-75)	Long broken	Various- mainly westerly	Upper to toe Mainly bench	940	1120
OF	B, 2, X, Y, Z	20 (15-30)	Short broken	Various mainly easterly	Toe to bench	960	1080
OR	D/E	10 (0-35)	Short broken	Flat – southerly	Upper to bench	940	960
MF	F	5(3-7)	Long Uniform	Flat – southerly	Toe to depression	970	986

Treatment Unit	COMPACTION	SOIL DISPLACEMENT	SURFACE EROSION	FOREST FLOOR DISPLACEMENT	MASS WASTING
A/C	H-L	L-M	M-H	L-H	L-M
B	VH-H	L-M	L-H	L-H	L-M
D/E	VH	M-H	M	M-VH	L
F	VH	L-M	M	M	L-H

	Stratum	SUFACE ORGANIC MATERIAL DEPTH (cm)	SOIL TEXTURE	SOIL COARSE FRAGMENTSIZE (%)	SUBSOIL TEXTURE	SOIL COARSE FRAGMENTSIZE (%)	CARBONATES? Unfavourable SUBSTRATE
OR	A/C	Mull .5	SiL	0-	CL-LS	0-65, gravel some cobble	None noted
OF	B, 2, X, Y, Z	Mull 2.0	SiL	0	SiCL	60 Gravel some cobble	None noted
OR	D/E	Mull 0.5	SiL	5-10 gravel	SiCL	40 Gravel	17 cm carbonates
MF	F	Moder 3cm	SiL	20 Gravel	SiCL	31 gravel	None noted

STAND TENDING	CURRENT SOIL DISTURBANCE?	HIGHEST HAZARD RATING (LSD)	MAX. SOIL DISTURB.ALLOWANCE %
☐Yes ☒No	☒Yes ☐No ☐N/A 3.0%	Forest Floor Displacement/ Compaction	10

F. CURRENT STAND DESCRIPTION

SU	Strata Layer Rank	Species Composition										Age	Height	Ref.	Site	Density	Volume	Well-spaced
		Spp.	%	Spp.	%	Spp.	%	Spp.	%		%	(yrs)	(0.1) m	year	index	Stems/ha)	(m3/ha)	(stems/ha)
1	Vet	FD	80	Py	20	Pl						40	15.0		16	50-200		
	Pole	Fd	30	Py	70	Pl							4.0			133		
	Advance	Fd	60	Py	35	Pl		At	5				2.0			400		
	Regen	Fd	90	Py	5	Pl		At	5				0.2			2100		
2	Vet	FD	80	Py	20	Pl						40	15.0		16	200-400		
	Pole	Fd	70	Py	30	Pl							8.0			150		
	Advance	Fd	80	Py	20	Pl							2.5			440		
	Regen	Fd	80	Py	10	Pl		At	10				.3			3185		
3	Vet	FD	50	Py	30	Pl	20					40	13.0	2009	16	200		
	Pole	Fd	50	Py	30	Pl	20						11	2009		200		
	Advance	Fd	70	Py	30	Pl							2	2009		200		
	Regen	Fd	90	Py		Pl	10	At					.3	2009		600		

As Noted in original prescription plots SU 1 is TU A and C, SU 2 is TU B, 2, X, Y, Z, SU 3 is TU F

G. UNDERSTORY DESCRIPTION

SU OF TU A/C					
SHRUBS		Grasses forbs			
Species	% cover	Species	% cover	Species	% cover
Rosa	t-5	Pinegrass	50	Pleirozium schreiberi	1
Juniper Comm.	t-25	Arcto uva	10	Cryptogrammic layer	80
Shephardia can	0-1	bedstraw			
Snowberry	0-1	Columbia Needlegrass	20	Yarrow	T
Mahonia		Vetch		Balsam Root	t
Saskatoon berry		Richardson Needlegrass	2	Bluebunch wheatgrass	1
Aspen		Kentucky bluegrass		Black medic	2
Spirea betufolia	T	Pinegrass		Nodding onion	t
TU B, 2, X, Y, Z					
SHRUBS		Grasses forbs		Moss	
Species	% cover	Species	Species	% cover	Species
Rosa	0-5	Pinegrass	60-70	Pleirozium schreiberi	1
Juniper Comm.	t	Arcto uva	0-10		
Shephardia can	2	bedstraw	1		
Snowberry	2	Columbia Needlegrass	2	June grass	t
Mahonia	10	Vetch	1	Castellja	t
Saskatoon berry	1	Richardson Needlegrass	2		
Aspen	10	Kentucky bluegrass	2	Hawkweed	t
Spirea betufolia	10				
TU D/E					
SHRUBS		Grasses forbs		Moss	
Species	% cover	Species	% cover	Species	% cover
Saskatoon berry	20	Fescue	t	Cryptogrammic layer	40
Shephardia can	0-10	Arcto uva	15		1
Juniper com	0-10	Columbia Needlegrass	20		
Mahonia	0-1	Brown eyed Susan	t		

Rosa	5	Richardson Needlegrass			
		Kentucky bluegrass			
		Bluebunch wheatgrass	5		
		Old man beard	t		
		Nodding onion	t		
		Balsam root	5		

TU F

SHRUBS		Forbs		Mosses	
Species	Species	Species	Species	Species	Species
Rosa	t-5	Pinegrass	80		
Juniper Comm.	t	Fragaria	5	Cryptogrammic layer	80
Shephardia can	1	Clover	t		
Snowberry		Columbia Needlegrass	t	Viola	1
Mahonia		Vetch		Dandelion	1
Saskatoon berry	t	Richardson Needlegrass	t	Bluebunch wheatgrass	
Willow	1	Kentucky bluegrass		Pussytoes	2
Spirea betufolia	5	fescue	5	Nodding onion	t

. TARGET STAND CONDITIONS AND STRATEGY

Selection Criteria for crop trees to be retained (species preference, height, age, dbh, health, vigour, stem form, crown form, crown class, other): all Larch of all sizes (unique provenance), all Douglas fir and Ponderosa pine over 30cm DBH, larger Aspen and Cottonwood, no cottonwood noted on site.

I. POST-TREATMENT STANDARDS

Use the table below to enter the schedule of stand-level treatments and appropriate standards. Complete only the relevant columns.

TARGET				SCHEDULE		STAND STRUCTURAL ATTRIBUTES								
						Species		Target No. Well-spaced /ha	Min. Pref. Well-spaced SPH	Min. Inter-tree Dist	Min. Total Well-spaced SPH	Max. Total Count SPH	Min. BA or Vol.	Prune Min. Lift Height
TU	Height	DBH	Layer	Treatment	Area (ha)	Preferred	Acceptable							
A			all	Broadcast burn		Py, Lw, Fd	Pl, At	20	0	1.0		75		
B, 2, X, Y, Z			all	Slash, pile burn, Broadcast burn		Py, Lw, Fd	Pl, At	400	75	1.0		700		
C/D			all	Pile and burn		Py, Lw, Fd	Pl, At	150	75	1.0		400		
E			all	No treatment		Py, Lw, Fd	Pl, At	150	75	1.0		400		
F			All	No treatment		Sx, Lw, Fd, Pl	At, Ep	1200	700	2.0	700	25000		

OTHER POST-TREATMENT STANDARDS: Describe any other post-treatment standards (type and rate of fertilizer, minimum live crown percent after pruning, maximum stump height after spacing, or other appropriate standards that apply to Forest Health, IRM, wildlife trees, etc.)

- Use existing roads and landings
- Slash all trees < 15 cm dbh over 30 cm tall in TU B, C and D and pile slash. TU A has minimal conifers.
- No slashing in TU E.
- Do not slash any pruned trees.
- Do not fall any snags in TU C.
- Remove all slash and debris within 20m of Hydro R/W and follow standard work safety procedures around Hydro lines.
- Retain shrubs around riparian areas and retain a minimum of 25% dominant and co-dominant trees in riparian management areas.
- Slash all stems within 3 metres of fence lines and WTPs boundaries; pile slash and burn. Do not cut within WTPs unless otherwise noted.
- In WTP # 9, fall and buck all Pli infected with mountain pine beetle. Cut all trees < 15 cm in the wildlife tree patch #9. Prune lower limbs to 3 metres height to fire-proof the WTP and snags.
- Pile slash at the base on approx. 200 large diameter conifers (Py, Lw and Fd) throughout TU B, 2, X, Y Z to recruit snags.
- Remove all fuels within 3 metres of fireguard in TU F and pile.
- Any pruned trees should have 3m lift.

J. SPECIAL AREAS

SPECIAL AREAS WITHIN STANDARDS UNIT? ☒Yes ☐No	TYPE OF SPECIAL AREA; Wildlife Tree Patch (e.g., Riparian Reserve Zone, Riparian Mgmt Zone, Lakeshore Mgmt Zone, FENs, research installations, other)

AREA NO. TU A/B/D	SIZE ha	Description of special area and significant features

Small wetlands were identified in SUA and C and they are ribboned as WTP's.

DESCRIBE HOW MANAGEMENT ACTIVITIETS DIFFER FROM THE REST OF THE STANDARDS UNIT

No slashing to occur adjacent to wetland areas but burning may or may not occur as it would during a natural fire.

COMMENTS	INITIALS			
	PREPARED BY	LICENSEE	MINISTRY OFFICIAL	DISTRICT MANAGER

FS68 HFP 98/6
****F9 to update totals**