

**BECHER PRAIRIE
RANGE UNIT**

**ECOSYSTEM RESTORATION
STRATEGIC PLAN**

prepared for:

**British Columbia Ministry
of Forests and Range
Central Cariboo Forest District**

by

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March, 2008

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Executive Summary

There has been a recent resurgence in interest on the effects of fire suppression on dry forest types throughout western North America. Major problems have been identified including forest health problems, loss of merchantable volume in overstocked stands, increased risk of catastrophic wildfire, and reduced forage production. The principal cause of these problems has been identified as forest encroachment and forest ingrowth. Although interest is high in other parts of British Columbia where Interior Douglas-fir forest types exist, little work has been done to characterize the problem in the Chilcotin grasslands. While various Ecosystem Restoration efforts have been made in the Cariboo-Chilcotin over the past 20 years, most have been ad-hoc. The Central Cariboo District has conducted grassland burning and some slashing projects to control forest encroachment, but never as part of a strategic plan.

In 2006 the Central Cariboo District was awarded funds to conduct an ecosystem restoration pilot project. The goal of this project is to produce an Ecosystem Restoration Strategic Plan to manage the density, distribution and species composition of forest within the Grasslands Benchmark area at the Becher Prairie Range Unit to more closely reflect fire-based ecosystem (grassland) conditions prior to the introduction of cattle grazing and timber harvest, and the suppression of natural fire. Objectives of the Strategic Plan are: a) minimize the long-term damage to grassland vegetation and soils; b) maintain treated sites in a restored condition; c) maintain or improve forage production; and, d) improve and increase habitat for grassland dependent native plant/animal species and associated plant communities.

The Becher Prairie Range Unit is located on the west side of the Fraser River, approximately 35 km west of Williams Lake, BC. The range unit consists of about 19,000 ha with several different grazing and forest tenures on Crown land, the Military Reserve and Grazing Leases. Private Land within the boundaries of the range unit totals 2300 ha. About 16,800 ha were surveyed as the background for the development of an Ecosystem Restoration Strategic Plan.

Grassland and open forest within the grassland benchmark area totals approximately 7400 ha, or about 44% of the range unit. Forest encroachment was verified on more than 3700 ha, indicating one-half of the grassland benchmark area is in need of treatment. Encroachment has affected approximately 40, 72 and 95% of Treatment Units in the open range, open range/open forest, and open forest classes, respectively.

The Richardson's needlegrass leading range type is dominant in the grassland benchmark area, but the bluebunch wheatgrass leading type is also important. These range types are mainly found in open grassland and open forest areas. Pinegrass dominates the herbaceous layer in closed forest polygons. These range types correspond to some plant communities that are red- and blue-listed in BC. Forest harvest, stand-tending, prescribed fire and grazing/browsing management are the most likely methods of restoring these communities. Red- and blue-listed wildlife species that potentially use these plant communities will also benefit from restoration activities.

Restoration treatments can be classed as commercial and non-commercial. Forest products available as a result of commercial treatments include sawlogs, post and rail material, grape stakes, pulpwood, pulp and OSB chips and hog-fuel. Revenue from these products can be used as cost recovery for non-commercial treatments. Some harvesting will be required beyond the grassland benchmark. Non-renewable Forest Licenses may be the best vehicle to initiate treatments in the grassland benchmark area. Harvest and stand-tending contractors will need incentives in order to make operations viable, such as allowing salvage of forest products, and setting stumpage at the upset rate.

Strategic Plans to restore grasslands in the benchmark area will require a cooperative approach between government, tenure holders and forest harvest/stand-tending contractors. Dedication of resources to initiate these plans, and the willingness of all participants to move toward an adaptive management philosophy, are the key elements in managing grasslands and forest within the grassland benchmark area.

Acknowledgements

Many people contributed both time and resources toward the completion of this project. I wish to acknowledge the following people:

- Harry Jennings, BC Ministry of Forests and Range, Range Branch
- Chris Armes, BC Ministry of Forests and Range, Central Cariboo Forest District
- Dianne Gibson, BC Ministry of Forests and Range, Central Cariboo Forest District
- Morgan Rankin, BC Ministry of Forests and Range, Central Cariboo Forest District

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1.0 Introduction

While interest in the effects of fire suppression in dry-forest types is currently high, the problem is not a new one. Nearly 90 years ago the spread of forests into grasslands was a recognized problem in southern British Columbia (Whitford and Craig 1918 as cited in Strang and Parminter 1980). Tisdale (1950), in a review of livestock grazing on forest lands in the interior of British Columbia, identified the invasion of open or semi-open areas by tree growth as a common phenomenon over much of the interior. He noted the reduction in grazing capacity and usefulness as early range, which accompanied forest encroachment in these areas.

While various Ecosystem Restoration efforts have been made in the Cariboo-Chilcotin over the past 20 years, most have been ad-hoc. The Williams Lake Forest District (now the Central Cariboo District) has conducted grassland burning and some slashing projects to control forest encroachment, but never as part of a strategic plan. In 2006 the Central Cariboo District was awarded funds with which to conduct an ecosystem restoration pilot project.

1.1 Background

Although interest is high in parts of British Columbia, where the Ponderosa pine and Interior Douglas-fir forest types exist, little work has been done to characterize the problem in the Chilcotin grasslands of the Central Cariboo Forest District. The exception is a study by Strang and Parminter (1980) near Riske Creek. They attributed forest encroachment to a combination of the absence of fire, absence of grass competition, and subtle micro-site determinants of soil moisture availability.

Fire suppression activities were not organized in the Cariboo Forest Region until 1961 (J. S. Muraro in Strang and Parminter 1980). However, in the fire chronology of Dester Ridge, the area studied by these authors, it was revealed that there had not been a fire of sufficient intensity to cause fire scarring since 1926. Previous to 1926, Strang and Parminter (1980) estimated a fire return interval of 9.8 years. Indeed, Tisdale (1950) noted that heavy grazing had aided forest encroachment in BC by removing fine fuels and reducing herbaceous vegetation competition on some sites, but that much of the encroachment was due to a natural return of trees to areas deforested in the past by repeated fires.

In the 1920's and 1930's up to 4,000-5,000 cows grazed Bald Mountain and Becher Prairie from spring until fall and range condition was considered to be poor. The absence of fine fuels as a result of this over-stocking likely prevented fires in the forest/grassland interface. As recently as 1963, 1,500 cows were grazed season-long on Bald Mountain and Becher Prairie (Ross Fredell, ret., BC Ministry of Forests, personal communication).

The primary ingrowth species has been identified as Douglas-fir, but lodgepole pine is also important. Additionally, aspen may have increased through suckering in some areas (Strang and Parminter 1980, Kay et al 1994). Range burns, as a method of reducing forest ingrowth and encroachment, have met with some success in the Central Cariboo Forest District, but generally have not been intense enough for a satisfactory kill of tree seedlings (Fred Knezovitch, ret., BC Ministry of Forests, personal communication).

Burns have generally been conducted in spring due to concerns with escapement into timbered areas. Hall (1976), working in the Blue Mountains of Oregon on the effects of underburning on ponderosa pine, Douglas-fir, and white fir, found that the absence of underburning resulted in a different primary succession in these forests. While ponderosa pine develops a fire-resistant bark containing a 6 to 14 mm thick dead outer layer at 5 cm outer diameter at ground level, Douglas-fir bark remains photosynthetically active at up to 10 cm outer diameter at ground level. With the elimination of underburning in the Blue Mountains ponderosa pine are being replaced by Douglas-fir and white fir.

Similarly, in the Chilcotin, a combination of the absence of periodic ground fires and the removal of fine fuels by historic overgrazing has led to the creation of appropriate seedbeds for tree germination (Strang and Parminter 1980). The coincidence of large tree seed crops with the micro-climatic susceptibility of some sites has enabled forest encroachment and forest ingrowth. Tree germination appears to have occurred in “waves” which correspond to heavy seed crop production combined with favourable moisture conditions. Douglas-fir and lodgepole pine are the principal ingrowth and encroachment species. Arno and Gruell (1986), working in Montana, attributed the establishment of large areas of pole-sized Douglas-fir to periods of near-normal or better than normal moisture conditions. They also noted that, historically, periods of Douglas-fir establishment ended with the onset of periods of drought. These waves of conifer regeneration may last 10 to 15 years.

These factors have contributed to a situation on the Becher Prairie Range Unit where the carrying capacity of the range has decreased with an attendant loss of AUM's. An additional concern is that grazing is increasingly concentrated on non-forested areas with a possible result being altered plant communities, decreasing range condition, and a possible loss of biodiversity.

Forest harvest has been conducted on the range unit in recent years, and should partially compensate for lost grazing opportunities in the open grassland and open forest. However, these opportunities are temporary. Also, grazing tends to focus on the domestic forage seedings on roadsides and landings.

Land use planning initiatives began in 1994 and resulted in the creation of the Cariboo-Chilcotin Land Use Plan (CCLUP). The Grazing Enhancement Fund (GEF) was created to compensate agricultural interests that were affected by the land use planning process.

In 1996 a project was initiated under the GEF to document forest encroachment and ingrowth in the Bald Mountain and Becher Prairie range units between 1962 and 1993/95 (Ross 1997). This starting date coincided with the beginning of active fire suppression and calculation of the Annual Allowable Cut (AAC) in the Cariboo Forest Region (Ross Fredell - personal communication).

Objectives were:

1. Determine the distribution of forest canopy cover classes in the Bald Mountain and Becher Prairie range units in 1962
2. Determine the distribution of forest canopy cover classes in the Bald Mountain and Becher Prairie range units in 1993/95

3. Estimate the area of forest encroachment on open grassland and forest ingrowth on treed grassland and open forest on Crown Land in the Bald Mountain and Becher Prairie range units
4. Estimate the AUM losses due to forest encroachment and forest ingrowth in the Bald Mountain and Becher Prairie range units

General findings on the occurrence of forest ingrowth and encroachment on Bald Mountain and Becher Prairie (Ross 1997) were:

- 1) Forest encroachment is more prevalent than forest ingrowth. There is a continuous forest edge in many places. Ingrowth may have already occurred on most sites.
- 2) North and east exposures are most susceptible.
- 3) Encroachment into small grassland openings in the forest, and narrow “necks” of open grassland extending into areas of open or closed forest is common. Patches of timber have coalesced due to encroachment and ingrowth.
- 4) Encroachment from contiguous areas of closed forest. Encroachment can be from any aspect. The explanation is likely increased shading in these areas. It may even occur from small islands of timber in open grassland.
- 5) Gullies and microtopography create ingrowth and encroachment sites.
- 6) Litter and grazing - the relationship between these factors and forest ingrowth and encroachment is not definitive. It is possible to have a similar amount of forest encroachment on two different sites which have differing amounts of standing litter.
- 7) Prevailing winds - effect on tree seed dispersal and evapo-transpiration
- 8) Elevation affects the ingrowth/encroachment species.
 - Douglas-fir is the most prevalent species on Bald Mountain.
 - Lodgepole pine is most prevalent at the lower elevations on Becher Prairie, while Douglas-fir occurs mainly on the upper elevation sites.

From a range management perspective, the decrease in the area of open grassland represents a serious concern. The potential exists for decreases in range condition, loss of biodiversity, and decreases in stocking rates and the number of AUM's allocated as livestock grazing is concentrated on a shrinking resource. On Becher Prairie, open grassland has decreased by more than 2,900 ha between 1962 and 1993/95, meaning an average of more than 90 ha/year have been lost. Crown range is stocked at approximately 1.4 ha/AUM on Becher Prairie. Therefore, the lost grazing opportunities between 1962 and 1993/95 are equivalent to 2,071 AUM's at this stocking rate. Inaction on forest ingrowth and encroachment will result in further losses to the open grassland.

Similar work was conducted on the Junction, Word Creek, Lone Cabin Creek, Dog Creek, Canoe Creek and Meadow Lake range units comparing airphotos from 1961-75 and 1995-7 (Ross 2000). Results indicate that the open grassland class was reduced by between 18 and 51% between the two dates at these range units.

Relationships between forest encroachment and ingrowth and site biophysical factors were further investigated by Bai et al (2004). Nearly 50,000 ha encompassed by the Becher Prairie, Bald Mountain, Junction, Word Creek, Lone Cabin Creek, Dog Creek, Canoe Creek and Meadow Lake range units were evaluated.

This study found:

- The greatest change in forest cover was between elevations of 700 and 1000 m
- Open grasslands occurred mainly on southern aspects and the shift to treed grassland and open forest was most likely there
- The probability of shift from open grassland to treed or open forest decreased with increasing slope degree
- Closed forest most often occurred on northerly facing slopes and the shift from open forest to closed forest was most likely to occur there

In 1997 the Cariboo-Chilcotin Grassland Strategy Working Group was directed by the Inter-agency Management Committee (IAMC) to prepare a grassland strategy that would serve as a strategic framework for grassland conservation in the Cariboo-Chilcotin.

Specific objectives were to:

- Recommend a grassland benchmark area
- Recommend management objectives for the grassland benchmark area,
- Evaluate implications of the benchmark on forage production, AUM allocation, biodiversity and timber

The grassland benchmark was established and signed off by the IAMC in 2000. The benchmark was established based on the work by Ross (1997, 2000) and Bai et al (2000), and the area and extent of open grassland on inventory maps prepared between 1962 and 1975 (Ministry of Forests 1963, 1975). These inventory maps were the first digital inventory available and were based on interpretation of aerial photography from this time period. While the ecological extent of grasslands does extend beyond the benchmark, it was determined that establishing the extent of the “true” grassland would require a prohibitive expenditure of time, effort and money. Also, it was felt that the potential impact on the timber supply was not consistent with CCLUP objectives.

1.2 Objectives

The goal of this project is to produce an Ecosystem Restoration Strategic Plan to manage the density, distribution and species composition of forest within the CCLUP Grasslands Benchmark at the Becher Prairie Range Unit to more closely reflect fire-based ecosystem (grassland) conditions prior to the introduction of cattle grazing and timber harvest, and the suppression of natural fire.

Objectives of the Strategic Plan are as follows:

- a) minimize the long-term damage to grassland vegetation and soils;
- b) maintain treated sites in a restored condition;
- c) maintain or improve forage production; and
- d) improve and increase habitat for grassland dependent native plant/animal species and associated plant communities.

2.0 Site Description

The Becher Prairie Range Unit is located on the west side of the Fraser River, approximately 35 km west of Williams Lake, BC (Figure 1). The range unit consists of several different tenures with permittees grazing on Crown land, the Military Reserve, Grazing Leases, and private land within the boundaries of the range unit. The Crown grassland portion consists of approximately 5,700 ha and is grazed by 1,500 cows for three weeks in spring and five weeks in fall on an annual basis (4,100AUM's). Stocking rate is slightly <1.4 ha/AUM. Forest tenure is held by West Fraser Timber.

2.1 Landforms and Soils

The Becher Prairie Range Unit lies within the Fraser Plateau West subdivision of the Interior Plateau of British Columbia (Holland 1976). The Fraser Plateau is a rolling, drumlinized till plain dissected by deep valleys and containing some isolated hills (Valentine et al 1978). It slopes from the southwest to the northeast starting at about 1500 m ASL and gradually falling to about 1000 m ASL. The bedrock is comprised of basalt and andesite lava flows with a few intrusions of granodiorite. Limestone and argillite is also found (Valentine et al 1987). As a result, these base rich rocks have produced alkaline soils and subsoils. In depressions the soils are sometimes alkaline and/or saline.

Morainal deposits (glacial till) are the most common surficial material in the study area. Depths vary from a few centimeters to >5 meters. They consist of a heterogenous mixture of boulders, cobbles, pebbles, sand, silt, and clay (Valentine et al 1987). The undulating topography of morainal areas produces soils with different moisture regimes, depending on slope position. Typically, there are drier soils on crests and progressively moister soils downslope. In depressions there may be organic soils or lakes.

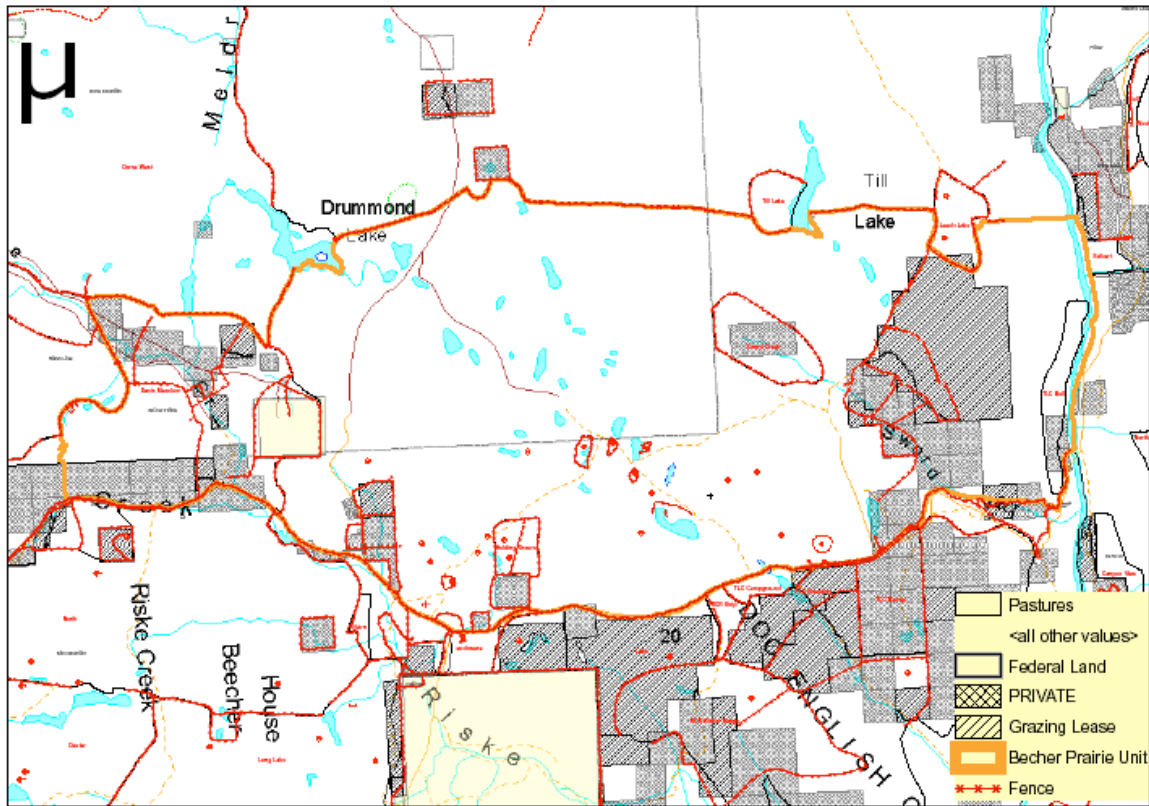


Figure 1. Becher Prairie Range Unit.

The Chimney and Williams Lake soil associations comprise the majority of the area (Figure 2). Small areas of the Drummond (Eluviated Dark Brown Chernozem), Whiskey Creek (Orthic Eutric Brunisol), and Meldrum-Hawks (Orthic Gray Luvisol) soil associations are also found within these range units.

Chimney soils are classified as Orthic Dark Brown Chernozems (grassland soils) and are described as well-drained and moderately pervious with a subhumid moisture regime. They are characterized by an organic-enriched surface horizon (Ah), a slightly weathered subsurface horizon (B), and a calcareous parent material (Valentine et al 1987). Chimney soils may be capped with a 2 to 15 cm thick loess veneer (Lord and Walmsley 1988).

Williams Lake soils are classified as Orthic Gray Luvisols (forest soils) and are described as having a subsurface rich in clay, calcareous parent material, and a thin surface litter layer. These soils are deep and well-drained, moderately pervious, with a subhumid moisture regime (Valentine et al 1987). There are numerous irregular patches of the forested Williams Lake soil association distributed throughout large expanses of grassland.

Compound units of Chimney soils and Williams Lake soils are a common map unit. They represent the ecotone between the grassland and the forest on the plateau (Valentine et al 1987).

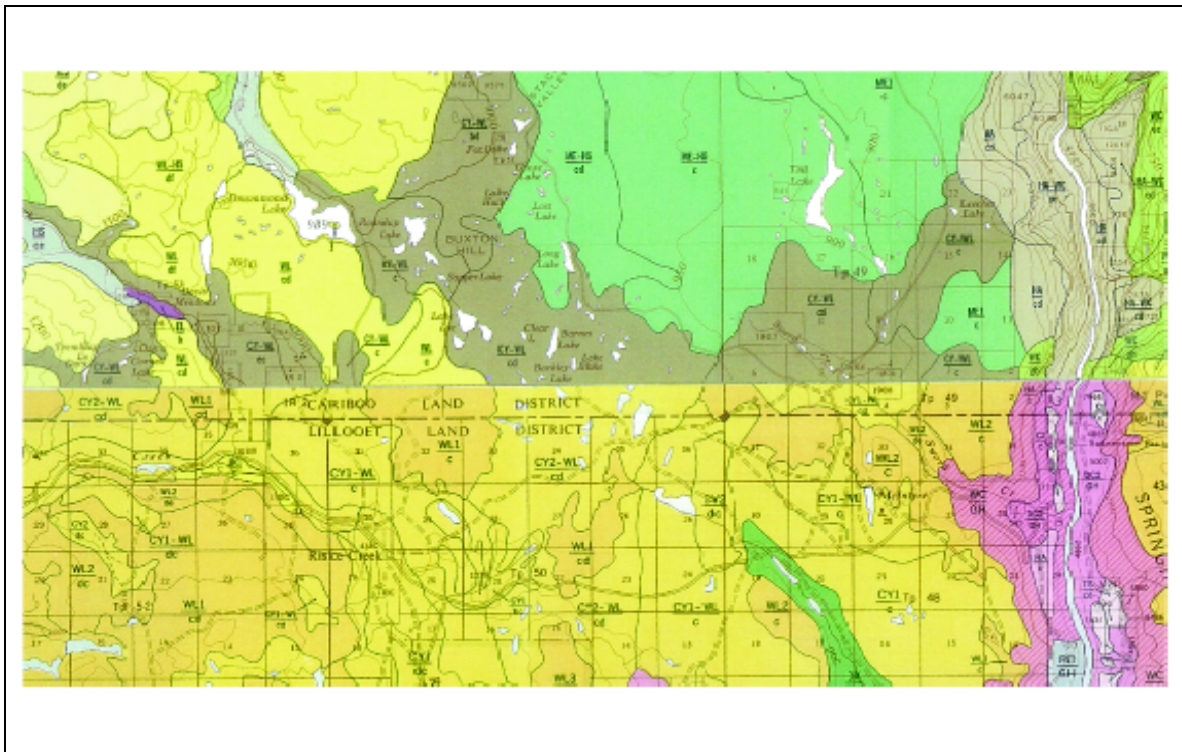
2.2 Vegetation

The range unit is located primarily within the Interior Douglas Fir (IDF) biogeoclimatic zone, with minor inclusions of the Bunchgrass (BG) biogeoclimatic zone (Annas and Coupe 1979, Steen and Coupe 1997). The most common Interior Douglas Fir subzones are the very dry, mild (IDFxm), the dry, cool Fraser variant (IDFdk3), and the dry, cool Chilcotin variant (IDFdk4), while the Bunchgrass zone is represented by the very dry, warm, Alkali variant (BGxw2).

The IDFxm subzone is located on lower to upper valley slopes associated with the Fraser River. The IDFdk3 occurs above the IDFxm along the west side of the Fraser River and on lower elevation areas of the Fraser Plateau. The IDFdk4 typically occupies low and mid elevation areas of the Fraser plateau in areas that are cooler and drier than the IDFdk3. The BGxw2 are described as upper valley slopes and terraces adjacent to the Fraser and Chilcotin rivers (Annas and Coupe 1979, Steen and Coupe 1997). The BGxw2 subzone is only found associated with the Fraser River in this range unit.

Major tree species are Douglas-fir¹, lodgepole pine, trembling aspen, and white spruce. Common shrubs are rose, juniper, bearberry, soopolallie, and bog-birch (Appendix 1). Grasses include bluebunch wheatgrass, sheep fescue, Kentucky bluegrass, needle-and-thread, Richardson's needlegrass, Sandberg bluegrass and pinegrass. Common forbs are goldenrod, shrubby penstemon, timber milkvetch, twinflower, western yarrow, showy aster, heart-leaved arnica and pussytoes. Goatsbeard is a common introduced weedy species.

¹Plant species names are after Hitchcock and Cronquist (1973).



Symbol	Soil Association	Parent Material	Texture	Drainage	Soil Classification	Description
CY	Chimney	moraine	l	w	DG, DB Chernozem	Grasslands with 20-60% forested soils
DX	Drummond	moraine	l	w	Eluviated DB Chernozem	Grasslands with 10-15% forest on rolling plateaus
HS	Hawks	glacio-fluvial	fsl	r	Eluviated Eutric Brunisol	Eskers, kames and meltwater deposits in narrow river valleys
ME	Meldrum	moraine	sil	w	Orthic G Luvisol	Level, level areas with 20-40% shallow soils, large boulders
WC	Whiskey Creek	moraine	vfsl	w	Orthic Eutric Brunisol; Chernozem	10-30% shallow soils over bedrock, included
WL	Williams Lake	moraine	fsl	mw	Orthic G Luvisol	Forested soils, 15-30% imperfectly drained

Figure 2. Soils at the Becher Prairie Range Unit.

2.3 Climate

The study area is located in the lee of the Coast Mountains. The area's climate is described as a moderate continental climate with cold winters and warm summers. Annual precipitation ranges from 320 to 450 mm (Lord and Walmsley 1988). The frost-free period may be as short as 40 days on some plateau areas. Average precipitation at Big Creek, approximately 45 km southwest of the range unit is 38.9 cm, while at Williams Lake precipitation averages 45.0 cm (Environment Canada 2008).

2.4 Wildlife

The Becher Prairie Range Unit is rated as having low to moderate (Class 3W and 4W) capability to support ungulates, in particular mule deer and moose (Canada Land Inventory 1976). Waterfowl capability is rated as high. There are several Ducks Unlimited projects in the unit. Carnivores such as black bear use the area. Red and blue-listed wildlife species in the IDF zone that may use the area are listed in Appendix 2 (BC Conservation Data Center 2008).

3.0 Methods

3.1 Stratification

All Crown land within the boundaries of the Becher Prairie Range Unit was included in the study area. Areas of private land within range unit boundaries were also mapped, but were not surveyed. The survey was organized by pasture or grazing area. Grazing leases were surveyed separately if fencing was contiguous, otherwise they were included within pastures. The Military Reserve was mapped separately.

The range unit was first stratified into Treatment Units (TU) of permanent range within pastures on 1:20,000 colour aerial photographs (2005). For this initial stratification, permanent range was assumed to be open range and open forest, and may include some associated riparian areas and aspen areas bordering wetlands, shallow water or lake features. Those areas classified as permanent range are predominantly within the "grassland matrix" as defined by the grassland benchmark.

Forest canopy closure classes follow forest cover (1:20,000) classes and are defined as; Open Range (OR) 0 to 10%, Open Forest (OF) 11 to 40% and Closed Forest (CF) >40% (BC Ministry of Forests 2007). The OR/OF class is incorporated to account for polygons that are a mosaic of the two types. Water, wetlands and private land are mapped separately. Forest encroachment on grasslands was mapped separately where observed within individual TUs.

Transitory range polygons were not mapped separately during this inventory. If harvest had been conducted within OR polygons, these areas were included in the OR polygon area. Other features including riparian areas, utility right-of-ways, roadsides and landings, agricultural fields, or rock outcrops were not mapped separately. Initial polygon boundaries were refined by examination of historical 1:15,840 airphotos (circa ~1962),

historical forest cover maps (BC Department of Lands, Forest and Water Resources 1963, 1975), and 1:100,000 soils maps.

Open range polygons serve as the grassland benchmark, however, due to variability in the landscape, TUs also contain open and closed forest polygons. Defining TUs in this way serves to improve the operability of the TUs. Some open and closed forest polygons will be treated along with the grassland areas. Other open and closed forest polygons will be retention areas that:

- are associated with riparian or moisture receiving sites, ridge crests or cool aspect slopes
- contain a component of mature or older trees >40cm dbh
- are at least one mature tree height in width (~ 20m)

3.2 Field Reconnaissance

Following the photo-interpretation, a field reconnaissance of the range unit was completed. This consisted of traveling throughout the grassland areas and visiting approximately 40 sites. General site characteristics and vegetation descriptions were recorded for each TU (Appendix 3, 4). Photos and GPS coordinates were also taken at each site (Appendix 5). Polygon boundaries were refined at this time.

Slope, aspect, elevation, landform and soil type were recorded. Forest canopy and the shrub and herbaceous layers were described. The overstory is composed of veteran and dominant trees, and mature trees >12.5 cm dbh (Layer 1 and 2). The regeneration layer consists of all trees up to 1.3 m in height (Layer 5) and those trees >1.3 m in height, but <7.5 cm dbh. The remaining trees comprise the understory (Layer 3 – 7.5 to 12.4 cm dbh). Range condition (Dyksterhuis 1949) is used to describe the seral stage of the herbaceous and shrub plant community's response to past grazing disturbance. Excellent range condition represents ecological "climax" while poor condition corresponds to the lowest seral stage.

3.3 Digital Mapping

The GIS work for this project was done with ESRI ArcGIS Version 9.3 at the ARC/INFO level. Appropriate 1:20,000 TRIM map sheets were downloaded and mylar sheets were used in order to transfer the photo-interpreted line-work. One sheet was created for each date (two sheets). The mylars were then digitized. The line-work was verified and cleaned for overshoots, undershoots, and then matched to the base map. Each polygon then had its appropriate attribute data entered and area calculated.

Information is presented in tabular and graphic format. Tables were created and incorporated into the report. A 1:20,000 polygon map was produced depicting current forest cover (pre-treatment) at the Becher Prairie Range Unit as observed in 2007 (Appendix 6). A second map was produced depicting recommended post-treatment forest cover (Appendix 7).

4.0 Results

4.1 Range Unit Description

For ease of data presentation and TU operability the range unit was divided by pastures where appropriate, by land tenure, and geographically where pastures were large. There are 12 pastures in the range unit, including the Military Reserve and three Grazing Leases. Becher was divided into eastern, middle and western sections (Table 1).

The Becher Prairie Range Unit, including Crown land, Grazing Leases, the Military Reserve and Private Land within the range unit boundary encompasses approximately 19,000 ha (Table 1). Private land totaled slightly more than 2300 ha, so the surveyed area of the range unit equaled approximately 16,800 ha. The largest blocks of private land are found in Becher East and Becher West. Other holdings in Becher Middle and Sword Creek are less than 130 ha.

The range unit was surveyed between August 23 and 26, 2007. Detailed TU descriptions are found in Appendix 3 and depicted on maps accompanying this report (Appendix 6 and 7).

4.2 Elevation, Slope and Aspect

Elevation at the Becher Prairie Range Unit ranged between 920 and 1100 m (Appendix 3). The lowest elevation areas were found in Becher Middle, while the highest elevations were found in Becher West and in the Military Reserve. Slopes within the grassland matrix were typically $<5^\circ$, but slopes of 10 to $30+^\circ$ were encountered, especially in Becher West. All aspects were represented, but OR polygons within the grassland benchmark area were usually located on southeast to southwest aspects (Appendix 3).

4.3 Landforms and Soils

At a landscape level the Becher Prairie Range Unit is best described as a rolling drumlinized till plain dissected by deep valleys and containing some isolated hills (Holland 1976). Most of the range unit is covered by morainal soils that exhibit internal drainage, which leads to the creation of enclosed depressions that may contain shallow waterbodies or wet soils with associated organic deposits. Glaciofluvial deposits are occasionally found in shallow valleys and meltwater channels. There are many areas of alkaline soils within the range unit that are variants from the modal soils (Appendix 3).

Soils from the Chimney and Williams Lake soil associations comprise the majority of the soils found within these range units. Small areas of the Drummond (Eluviated Dark Brown Chernozem), Whiskey Creek (Orthic Eutric Brunisol), and Meldrum-Hawks (Orthic Gray Luvisol) soil associations are also found within these range units.

Chimney soils are grassland soils that comprise the majority of soils within the range unit's grassland benchmark area. They are frequently associated with the Drummond association, soils that are slightly drier than the modal Chimney soil.

Table 1. Pastures at Becher Prairie Range Unit.

Pasture	Area (ha)
Leech Lake	222
Till Lake	1476
Becher East	3095
Sword Creek	362
Becher Middle	4822
Holding Ground	142
Military Reserve	5794
Becher West	2801
Grazing Lease #1	65
Grazing Lease #2	28
Grazing Lease #3	32
TLC Bull	259
Total	19096

Note: Private Land (2307 ha) included in Range Unit total area.

Williams Lake soils are forest soils that are distributed in irregular patches throughout large expanses of grassland. Compound units of Chimney and Williams Lake soils are a common map unit. They represent the ecotone between the grassland and the forest on the plateau (Valentine et al 1987).

The principal difference between the Chimney and Williams Lake soils appears to be landscape position. Chimney soils are usually found on drier aspects so chernozemic soil processes have occurred with grassland vegetation predominant. In contrast, Williams Lake soils are frequently found in slightly moister settings, where forest vegetation predominates and luvisolic soil processes are dominant.

4.4 Forest Cover

4.4.1 Range Unit

Closed forest was the largest forest cover class totaling 53% of the range unit, or more than 8900 ha (Table 2). Permanent range, including OR, OR/OF and OF polygons within the grassland benchmark area, accounts for 44% of the range unit. Open range was the largest class in the benchmark comprising slightly less than 4800 ha, or 28% of the surveyed area, while OR/OF polygons covered about 2400 ha. The open forest class was about 1%. Water and wetlands together comprise slightly more than 2% of the range unit.

4.4.2 Pastures

Leech Lake

Leech Lake is a small pasture in the northeast portion of the range unit. Forest cover is found in a CF polygon on a ridge on the north side with some patches on the west side. The rest of the unit is OR with encroachment mainly originating from CF patches found here. The pasture is about 220 ha.

Till Lake

The Till Lake grazing area is found adjacent to Leech Lake Pasture in the northeast portion of the range unit and is not fenced separately. It is bounded by the Meldrum Creek Forest Service Road to the east, by Sword Creek Pasture to the south, by the Military Reserve to the west, and by the Dome Mountain Range Unit to the north. Forest cover is largely CF with six TUs comprised of OR, OR/OF and OF polygons. Forest encroachment is prevalent in all TUs, except TU3. The TUs comprise about 470 ha of the total area of nearly 1480 ha.

Becher East

Becher East is situated to the east of the Meldrum Creek Forest Service Road and is bounded by the Fraser River and the TLC Bull Pasture to the east, the Dome Mountain Range Unit to the north, and by private land in the south. A large Grazing Lease is located within the area, but owing to the distribution of OR and OF polygons it was not surveyed separately. Like the Till Lake area, this pasture is largely CF, with TUs composed of patches of OR and OF polygons that total approximately 500 ha. Forest encroachment was found in all TUs. There are slightly more than 2400 ha in all, but 1880 ha are closed forest.

Table 2. Pre-treatment forest cover classes at the Becher Prairie Range Unit.

Pasture	Open	Open Range/	Open	Closed			Private		Total (less PL)
	Range	Open Forest	Forest	Forest	Wetland	Water	Land	Total	
-----ha-----									
TLC Bull	47	0	0	84	0	0	127	258	132
Leech Lake	140	0	0	78	0	3	0	222	222
Till Lake	267	118	58	1002	1	27	2	1476	1474
Becher East	168	330	0	1880	3	24	689	3095	2405
Sword Creek	88	60	0	71	12	5	127	362	236
Becher Middle	2366	479	153	1654	5	77	90	4822	4732
Holding Ground	0	130	0	11	0	1	0	142	142
Military Reserve	1234	941	0	3373	0	247	0	5794	5794
Becher West	368	355	0	785	12	9	1272	2801	1529
Grazing Lease #1	51	0	0	13	0	1	0	65	65
Grazing Lease #2	28	0	0	0	0	0	0	28	28
Grazing Lease #3	0	23	0	5	4	0	0	32	32
Total by Class	4757	2435	212	8957	36	394	2307	19096	16789

Permanent Range (ha) = (Open Range + Open Range/Open Forest + Open Forest)/Range Unit Total = 7403

Permanent Range (%) = (Open Range + Open Range/Open Forest + Open Forest)/Range Unit Excluding PL

= 44

Distribution (%)	Range Unit (excluding PL)	Permanent Range
Open Range	28	64
Open Range/Open Forest	15	33
Open Forest	1	3
Closed Forest	53	0
Wetlands	0	0
Water	2	0
	100	100

Sword Creek

Sword Creek is located to the south of Till Lake, and is bounded to the west by the Military Reserve, and by the Meldrum Creek Forest Service Road to the east. There are nearly 240 ha of Crown range at Sword Creek, of which OR is the largest class accounting for nearly 90 ha, but OR/OF also contributes 60 ha. Private land within this fenced pasture totals about 130 ha. Water and wetlands together comprise nearly 20 ha.

TLC Bull

The TLC Bull Pasture is bounded by the Fraser River to the east, by Becher East on the west side and by private land on the south. It is located on the Fraser River, so forest cover is a combination of CF on the edge of the plateau and OR polygons on steep, east to southeast aspects on the breaks above the river. Data from Bai et al (2004) indicate these sites are less likely to experience forest encroachment. Based on this information, the relatively small open range area, and the limited operability of the site, this pasture was deemed low priority and was not surveyed. It contains approximately 130 ha of Crown land, with less than 50 ha of OR.

Becher Middle

Becher Middle is the second largest of the pastures and consists of the portion of the range unit between the Meldrum Creek Forest Service Road and Stack Valley Road on the east and west, respectively, with the Military Reserve to the north and Highway 20 to the south. The pasture contains large OR areas that account for one-half of the pasture, with the CF areas bordering them accounting for about 35%. The OR/OF and OF classes combine for about 630 ha (13%). Forest encroachment is common from the edges of all CF polygons. There are numerous wetland, shallow water and lake features in this grazing area (82 ha). Becher Middle comprises more than 4700 ha of which about 3000 ha are currently at OR to OF stocking.

Holding Ground

Holding Ground is a small pasture fenced separately from Becher West. It is mainly OR, but there is a large area of encroachment extending from the forest edge to the east. There are several wetland and shallow water features in this grazing area. Holding Ground encompasses 142 ha.

Military Reserve

The Military Reserve is the largest pasture at nearly 5800 ha. It is located in the center of the unit to the north of Becher Middle. The Dome Mountain Range Unit is the north boundary. The Military Reserve is comprised of similar soils, grasslands and forests as Becher Middle, but land tenure and management activities have differed over the years so it was surveyed separately. Forest cover is predominantly CF at more than 3300 ha, but that total includes several large blocks of nearly continuous forest. Permanent range areas consist of about 1200 ha of OR, and another 940 ha of OR/OF. The OR polygons are a complex mosaic with CF and wetland areas associated. There are numerous lakes and shallow water features in this pasture. Forest encroachment is found in all TUs.

Becher West

Becher West is found in the west end of the range unit and includes numerous parcels of private land. Stack Valley Road is the east border, while the Dome Mountain and Raven Lake range units are found to the north and west, respectively. Treatment Units are centered on OR and OF polygons with associated CF. There are more than 1500 ha of Crown land at Becher West, but CF comprises 785 ha of that total. Open range and OR/OF polygons are evenly represented and account for most of the remaining lands. Water and wetlands combined are approximately 20 ha.

Grazing Leases 1, 2 and 3

These small units are all contained within the boundaries of Becher West. They were surveyed separately as they are contiguously fenced and have been managed separately from neighbouring Crown land. The distribution of OR, OF and CF is similar however, as are encroachment patterns and treatment options. They comprise 128 ha collectively.

4.5 Forest Encroachment

Forest encroachment was observed in all pastures and in most TUs during the reconnaissance survey. Of the more than 7400 ha of permanent range within the grassland benchmark, more than 3700 ha (50%) is affected by forest encroachment (Table 3). Although the OR class is the largest class in the grassland matrix, the total area affected by encroachment was approximately equal in the OR/OF class. While nearly 40% of the open range area has experienced encroachment, more than 70% of the OR/OF polygons are affected. Only 212 ha of open forest were mapped in the range unit, but encroachment has occurred on 95%.

All pastures are affected, although those where OR/OF and OF polygons predominate have lost a larger percentage of the grassland benchmark area (Appendix 3, 4, 6). Pastures with large OR polygons may have lost a lesser percentage of the area to encroachment, but a significant area requires treatment in these polygons.

4.6 Vegetation

Vegetation descriptions were compiled for each TU. The area of each plant community type as described below was derived by surveying all OR, OR/OF and OF polygons within the TU, with the dominant type being assigned to the whole TU. Variation in topography within the TU often results in more than one type being represented in an individual TU, so plant species community descriptions are provided (Appendix 3).

4.6.1 Open Grassland

Open grassland sites in the Becher Prairie Range Unit can be classified within the biogeoclimatic zones by site moisture characteristics. These types are not necessarily distinct, as they have many species in common, and are apt to intergrade based on subtle variations in topography and microclimate. The driest sites are those dominated by needle-and-thread and bluebunch wheatgrass, mesic sites are dominated by Richardson's needlegrass, while moister sites are usually dominated by pinegrass. Alkaline soils associated with wetlands and riparian areas have a distinctive plant community.

Table 3. Forest encroachment in permanent range areas at the Becher Prairie Range Unit.

Pasture	Open Range (ha)			Open Range/Open Forest (ha)			Open Forest (ha)			Pasture
	Total	Treat	No-treat	Total	Treat	No-treat	Total	Treat	No-treat	Total
TLC Bull	47	0	47	0	0	0	0	0	0	47
Leech Lake	140	28	113	0	0	0	0	0	0	140
Till Lake	267	111	156	118	110	8	58	48	10	443
Becher East	168	64	104	330	315	15	0	0	0	498
Sword Creek	88	3	85	60	47	13	0	0	0	148
Becher Middle	2366	831	1534	479	385	94	153	153	0	2998
Holding Ground	0	0	0	130	64	66	0	0	0	130
Military Reserve	1234	456	778	941	637	304	0	0	0	2175
Becher West	368	236	131	355	190	165	0	0	0	723
Grazing Lease #1	51	16	35	0	0	0	0	0	0	51
Grazing Lease #2	28	7	21	0	0	0	0	0	0	28
Grazing Lease #3	23	8	15	0	0	0	0	0	0	23
Total by Class	4779	1761	3019	2412	1747	665	212	201	10	7403

Permanent Range = (Open Range + Open Range/Open Forest + Open Forest) = 7403

Encroachment = 3709

Permanent Range	Encroachment (%)
Total Permanent Range	50
Open Range	37
Open Range/Open Forest	72
Open Forest	95

Soil moisture-holding capacity, as determined by soil texture and by small differences in slope and aspect, is quite variable within these units such that five basic grassland types are encountered (Table 4).

Type 1: Needle-and-thread/prairie junegrass

The needle-and-thread/prairie junegrass type is found on the driest sites and corresponds to the BGxw2 variant. Primarily, these are gentle to very gentle slopes and upper slope positions with 180° to 270° aspects, but occasionally occur on steep slopes. Needle-and-thread and prairie junegrass dominate the plant community, but significant amounts of bluebunch wheatgrass, western needlegrass, Kentucky bluegrass and Richardson's needlegrass may also be included. Common forbs include Holboell's rockcress, desert parsley and pussytoes. Shrub cover is predominantly big sagebrush. This type is not abundant in the range unit, and occurrences were not large enough to map for the purposes of this project. About 50 ha of this type was mapped in the TLC Bull Pasture.

Type 2: Inland saltgrass/Nuttal's alkaligrass

A saline-tolerant open grassland community is found most commonly associated with alkaline soils in wetlands and moist depressions throughout the range unit. The plant community is dominated by inland saltgrass and Nuttal's alkaligrass with inclusions of sedges, rushes, alkali cordgrass and northern wheatgrass. Many of the associated grass, forb and shrub species are found in the needle-and-thread/prairie junegrass type also. Many examples of this range type were found but they were generally too small to map separately. Mapped areas for Type 2 totaled 15 ha in Becher East.

Type 3: Bluebunch wheatgrass leading

This range type is most commonly associated with IDfxm sites, but also with drier soil phases of the IDfdk4 series. Bluebunch wheatgrass is the dominant species on good to excellent condition range. Needle-and-thread and prairie junegrass are associated on drier sites, while western needlegrass, Kentucky bluegrass, sheep fescue and Richardson's needlegrass are included in mesic sites. Common forbs are balsamroot, stoneseed, rosy pussytoes, and old man's whiskers. Shrub cover includes common juniper, Rocky Mountain juniper, rabbitbrush, prickly rose, and snowberry. About 1100 ha are found in the range unit in Till Lake, Becher Middle, Holding Ground and the Military Reserve.

Type 4: Richardson's needlegrass leading

This range type is by far the most common in the grassland benchmark area. It is found in OR and OF polygons, generally on mesic sites on ridgetops and on southwest aspect slopes, and is considered to be representative of the IDfdk4, and drier IDfdk3 sites. This type is dominated by Richardson's needlegrass with inclusions of Columbia needlegrass, timber oatgrass, porcupine grass, sheep fescue, bluebunch wheatgrass, prairie junegrass and pinegrass depending on soil moisture. Forb cover is variable and is at least partially dependant on soil moisture conditions. Drier sites will have dune goldenrod, pasture sage, rosy pussytoes, and sulphur buckwheat. Wetter sites will have populations of tiny penstemon, graceful cinquefoil and sticky geranium. About 6200 ha were mapped in the range unit in all pastures except Holding Ground.

Table 4. Range types at the Becher Prairie Range Unit.

Pasture	Type 1	Type 2	Type 3	Type 4	Type 5	Total
	-----ha-----					
Leech Lake	0	0	0	140	78	218
Till Lake	0	4	106	333	1002	1445
Becher East	0	11	0	487	1880	2378
Sword Creek	0	0	0	148	71	219
Becher Middle	0	0	66	2932	1654	4652
Holding Ground	0	0	130	0	11	141
Military Reserve	0	0	820	1355	3373	5548
Becher West	0	0	0	722	785	1507
Grazing Lease #1	0	0	0	51	13	64
Grazing Lease #2	0	0	0	28	0	28
Grazing Lease #3	0	0	0	23	5	28
TLC Bull	47	0	0	0	84	131
Total by Class	47	15	1122	6219	8957	16360

Domestic grass species

Domestic grass species were found throughout the Becher Prairie Range Unit, but no areas of domestic seedings were mapped separately. Crested wheatgrass was the most common domestic grass, but slender wheatgrass, bromegrass and orchardgrass were also found. Native grass and forb species are commonly associated. These species most likely originated from seeded roadsides and landings from previous forest harvest, and were subsequently distributed by cattle and wild ungulates.

4.6.2 Open Forest

Typically, open forest vegetation was dominated by Type 4 grasslands with occasional inclusions of Type 3. The grass component of Type 4 grasslands in the open forest are as described above, but the assemblage of plant species will vary among sites (Appendix 3).

4.6.3 Closed Forest

Type 5: Pinegrass leading

On sites traditionally dominated by heavier forest cover, such as steeper northeast aspects, a pinegrass leading grassland type is most prevalent. This site is representative of modal sites in the IDFdk3, and wetter sites in the IDFdk4, and is found in all pastures. Many of the species from Type 3 and 4 are included in drier micro-sites within this type. The composition of this community, as well as its distribution, is largely controlled by soil moisture and light conditions. Forest cover is generally OF or CF. As CF polygons were not surveyed in this project, Type 5 was not mapped separately in OR, OR/OF or OF polygons, but was noted when observed. However, it can be assumed to be dominant on the nearly 8900 ha of CF polygons in the range unit.

4.6.4 Invasive Plants

No Provincial or Regional designated noxious weeds were noted during the course of this reconnaissance level survey. Goatsbeard is the predominant invasive species and was common throughout the range unit with cover often averaging 5% over the TU. (Appendix 3). Other invasive species noted are mainly nuisance species including common mullien, mustards, curly-cup gumweed, field peppergrass and lambsquarter. Sulphur cinquefoil was found in Leech Lake (TU2) and Becher E pastures (TU6) (Appendix 3).

The Invasive Alien Plant Program (IAPP 2008) website notes spotted knapweed north of Rock Lake, and on the west end of the main road in the Military Reserve (IAPP 2008). Canada thistle was found at the south end of Stack Valley Road.

4.7 Forest Health

Mountain pine beetle (*Dendroctonus ponderosae*) is the predominant forest health agent in the range unit. The majority of lodgepole pine in all layers, except Layer 4 trees <2m in height and Layer 5 trees, were either at the grey or red attack stage (Appendix 4). In many cases heavy cone crops were in evidence (Appendix 3). Cones were usually open, but seed viability is in question. New germinants were not commonly noted on most sites.

Other forest health agents noted during the survey included pitch twig moth (*Petrova spp.*), mistletoe (*Arceuthobium spp.*), western spruce budworm (*Choristoneura occidentalis*) and conks or catface (*Atrophilus piniphila*). Poor form was common in Douglas-fir Layer 4 and 5 trees also, especially on dry aspects. This may be attributable to budworm attack or Douglas-fir needle cast (*Rhabdocline pseudotsuga*).

Grey-attack Layer 1 to 3 lodgepole pine trees are often found in mixed forests with trembling aspen and/or Douglas-fir. This is particularly true in small patches of timber in OR/OF and large OR polygons.

Photopoints collected during the previous ingrowth/encroachment survey are in contrast to those collected in the current survey (Ross 1997). These photos reveal lodgepole pine in all layers, but there is no visual evidence of the current level of forest health concerns, caused mainly by the mountain pine beetle (Appendix 5).

4.8 Wildlife

Black bears were the most frequently sighted large mammals during the survey. Mule deer sightings were recorded in several TUs. Waterfowl were observed using the many shallow water/marsh/meadow systems in the range unit. There are several Duck's Unlimited projects in the range unit.

No blue- or red-listed species, that may be present in the range unit, were observed (Appendix 2). There are no designated Wildlife Habitat Areas (WHA) within the range unit. A detailed wildlife survey was beyond the scope of this plan, but should be conducted as part of the monitoring program.

5.0 Management Plan

5.1 Stratification

Pastures were stratified into TUs at the onset of the reconnaissance survey, based on landforms, topography, forest cover type, fencelines and roads. Stratification in this way will enhance treatment application. Treatment units primarily contain OR, OR/OF and/or OF polygons within the grassland benchmark area, but retention areas will occur in most TUs. They are associated with a) riparian or moisture receiving sites, b) ridge crests or c) cool aspect slopes, that contain a component of mature or older trees >40cm dbh, and are at least one mature tree height in width (~ 20m).

5.2 Priority Areas for Restoration

5.2.1 Open Grassland

Restoring the OR component of the Becher Prairie Range Unit to the 1962 grassland benchmark is a major objective of this plan. Forest encroachment is prevalent on more than 3700 ha, one-half of the grassland benchmark area (Table 5). The range unit was divided into 40 TUs, of which 24 are OR, 13 are OR/OF and 3 are OF. Encroachment by TU ranges from 0 to 100% for OR units, between 30 and 100% for OR/OF, and between 66 and 87% for OF.

Comments from the 1996 study are still relevant to current conditions (Ross 1997). Typically, encroachment into open grasslands occurs on southerly aspects on gentle slopes. This is evident in large OR polygons such as those in Becher Middle and the Military Reserve. Forest ingrowth causes shifts to open forest here as well (Bai et al 2004). Examples are found in Becher Middle (TU5, 6 and 7).

There is a continuous forest edge on many sites where ingrowth may have already occurred. Shifts from open forest to closed forest are most likely to occur on northerly facing slopes (Bai et al 2004). Increased shading in these areas is the common factor leading to increased tree seedling survival at these sites. All large OR polygons in Becher Middle, Becher West and the Military Reserve are affected.

Encroachment from contiguous areas of closed forest is common and can be from any aspect. Small grassland openings in the forest, and narrow “necks” of open grassland extending into areas of open or closed forest are most susceptible. This occurrence is common to all TUs that are currently in OR/OF stocking. These include Till Lake (TU4, 5) and Becher West (TU3, 4, 5). In these cases a continuous forest edge develops. Patches of timber have coalesced due to encroachment and ingrowth and encroachment occurs from small islands of timber in open grassland (Till Lake TU2, Military Reserve TU3, 4). Gullies and microtopography also create encroachment sites.

Other factors affect the distribution of forest ingrowth in the range unit. Elevation affects the ingrowth/encroachment species with lodgepole pine most prevalent at lower elevations and Douglas-fir at higher elevations (Appendix 3). Prevailing winds impact tree seed dispersal and evapo-transpiration levels in soils. This can be seen in the encroachment patterns found in large OR polygons, such as in Becher Middle (TU3, 4, 8)

Table 5. Treatment Units at the Becher Prairie Range Unit.

Pasture	Treatment Unit	Current Forest Cover	TU		Treatment	Treatment (%)	Pasture Total
			Total	No-treatment (ha)			
Leech Lake	1	OR	73	54	20	27	
	2	OR	67	59	8	12	
Pasture Total							140
Till Lake	1	OR	90	43	48	53	
	2	OF	58	10	48	82	
	3	OR	4	4	0	0	
	4	OR	106	53	53	50	
	5	OR/OF	118	8	110	94	
	6	OR	67	56	10	15	
Pasture Total							443
Becher East	1	OR/OF	53	15	38	71	
	2	OR	11	11	0	0	
	3	OR	101	52	49	48	
	4	OR/OF	247	0	247	100	
	5	OR	56	42	15	26	
	6	OR	30	0	30	100	
Pasture Total							498
Sword Creek	1	OR	88	85	3	4	
	2	OR/OF	60	13	47	78	
Pasture Total							148
Becher Middle	1	OR	60	23	37	61	
	2	OR/OF	146	0	146	100	
	3	OR	686	560	126	18	
	4	OR	395	241	154	39	
	5	OF	66	0	66	100	
	6	OF	87	0	87	100	
	7	OR/OF	222	17	205	93	
	8	OR	1194	696	498	42	
	9	OR	31	15	16	52	
	10	OR/OF	111	78	34	30	
Pasture Total							2998
Holding Ground	1	OR/OF	130	66	64	49	
Pasture Total							130
Military Reserve	1	OR	414	231	183	44	
	2	OR	820	547	273	33	
	3	OR/OF	834	288	546	66	
	4	OR/OF	107	17	90	84	
Pasture Total							2175

Table 5 (cont'd).

Pasture	Treatment Unit	Current Forest Cover	TU	No-treatment	Treatment	Treatment	Pasture	
			Total	(ha)		(%)	Total	
Becher West	1	OR	95	50	44	47		
	2	OR	160	49	111	69		
	3	OR	113	32	81	72		
	4	OR/OF	96	57	39	41		
	5	OR/OF	259	108	151	58		
Pasture Total							722	
Grazing Lease #1	1	OR	51	35	16	32		
Pasture Total							51	
Grazing Lease #2	1	OR	28	21	7	25		
Pasture Total							28	
Grazing Lease #3	1	OR/OF	23	15	8	34		
Pasture Total							23	
TLC Bull	1	OR	47	47	0	0		
Pasture Total							47	
Permanent Range Total								7403

and the Military Reserve. Encroachment is mainly located on the perimeter, with fewer encroachment sites in the center of the polygon (Appendix 5).

The relationship between litter and grazing, and forest encroachment and ingrowth is not definitive. It is possible to have a similar amount of forest encroachment on two different sites that have differing amounts of standing litter. For example, litter at Becher Middle TU2 was estimated to range between 50 and 75%, while at Becher Middle TU5 litter was as high as 95%. Encroachment covers 100% of both units (Table 5, Appendix 3).

5.2.2 Open Forest

District OF polygons within TUs account for a minor area of the encroachment sites, at approximately 200 ha. They are more typically arrayed in a mosaic with OR polygons as OR/OF units. These areas should be treated in conjunction with OR polygons within TUs to improve the efficiency of the operation and to assist in maintaining OR polygons at desired stocking levels.

5.2.3 Closed Forest

Closed forest areas, as mapped in this plan, are generally outside the grassland benchmark area. However borders between OR and CF polygons are rarely distinct and grassland plant species commonly range into the forest depending on aspect and slope (Appendix 3). In the interest of ecosystem restoration objectives in many TUs, the forest margin should be included in the treatment areas, along with isolated clumps of timber within OR polygons. This is especially important in attempting to salvage value from red and grey attack lodgepole pine. This practice will also aid in treatment cost recovery.

5.3 Commercial Harvesting Treatments

Priorities and post-treatment stocking have been generated for each TU. Priorities are primarily based on the amount of encroachment, but the nature of treatments required for restoration, and options for cost recovery are also factors (Table 6). Restoration priorities are ranked by the following definitions:

- Priority 1 (High) – encroachment is >60% of the TU
- Priority 2 (Medium) – encroachment is 30 to 60% of the TU
- Priority 3 (Low) – encroachment is <30% of the TU

5.4 Forest Products

Forest products include sawlogs, post and rail material, grape stakes, pulpwood, pulp chips, OSB chips and hog-fuel. These products can be extracted with the potential to offset the cost of non-commercial treatments. The reconnaissance survey identified locations where these products exist, and suitable treatments to extract them. However, volume estimates for each type are beyond the scope of this report. Available volume partially depends on the intensity of harvest in retention zones, and harvest beyond the grassland benchmark into closed forest. Ecosystem Restoration Prescriptions, Harvest and Stand-tending plans should be devised for each TU. Some revenue and expense scenarios are presented in Table 7.

Table 6. Treatments and treatment priorities at the Becher Prairie Range Unit.

Pasture	Treatment Unit	Pre-treat Forest Cover	Post-treat Forest Cover	Priority	Treatment	TU Total	Pasture Total
Leech Lake	1	OR	OR	3	S, D, P	73	
	2	OR	OR	3	S, D, P	67	
Pasture Total							140
Till Lake	1	OR	OR	2	H, T, S, D, P	90	
	2	OF	OR	1	H, T, S, D, C, P S, P	58	
	3	OR	OR	3	S, P	4	
	4	OR	OR	2	H, S, D, C, P	106	
	5	OR/OF	OR/OF	1	H, T, S, D, C, P	118	
	6	OR	OR	3	S, D, P	67	
Pasture Total							443
Becher East	1	OR/OF	OR	1	H, S, D, C, P	53	
	2	OR	OR	3	S, P	11	
	3	OR	OR	2	H, T, S, D, C, P	101	
	4	OR/OF	OR/OF	1	H, T, S, D, C, P	247	
	5	OR	OR	3	S, P	56	
	6	OR/OF	OR/OF	1	H, T, S, D, C, P	30	
Pasture Total							498
Sword Creek	1	OR	OR	3	H, S, P	88	
	2	OR/OF	OR/OF	1	H, T, S, C	60	
Pasture Total							148
Becher Middle	1	OR/OF	OR	1	H, S, D, P	60	
	2	OR/OF	OR	1	H, S, D, C	146	
	3	OR	OR	3	H, S, P	686	
	4	OR	OR	2	H, T, S, D, P	395	
	5	OF	OR	1	H, T, S, D, C	66	
	6	OF	OR	1	H, T, S, D, C	87	
	7	OR/OF	OR	1	H, S, D, C	222	
	8	OR	OR	2	S, P	1194	
	9	OR	OR	2	H, S, D, P	31	
	10	OR/OF	OR	2	H, S, D, P	111	
Pasture Total							2998
Holding Ground	1	OR/OF	OR	2	H, S, P	130	
Pasture Total							130
Military Reserve	1	OR	OR	2	H, S, D, P	414	
	2	OR	OR	2	H, S, D, P	820	
	3	OR/OF	OR	1	H, S, D, P	834	
	4	OR/OF	OR	1	H, S, D, C	107	
Pasture Total							2175

Table 6. (cont'd)

Pasture	Treatment Unit	Pre-treat Forest Cover	Post-treat Forest Cover	Priority	Treatment	TU Total	Pasture Total
Becher West	1	OR	OR	2	H, T, S, D, C	95	722
	2	OR	OR	1	H, S, D, C	160	
	3	OR	OR	1	H, T, S, C	113	
	4	OR/OF	OR	2	H, S, D, P	96	
	5	OR/OF	OR	2	H, S, D, P	259	
Pasture Total							
Grazing Lease #1	1	OR	OR	2	H, S	51	51
Pasture Total							
Grazing Lease #2	1	OR	OR	3	S, P	28	28
Pasture Total							
Grazing Lease #3	1	OR/OF	OR	2	H, S, P	23	23
Pasture Total							
TLC Bull	1	OR	OR	3	N/A	47	47
Pasture Total							
Permanent Range Total							7403

Treatments

H=harvest overstory; T=log/thin understory; S=slash understory/regen;
 D=salvage dead overstory; C=clean-up burn; P=prescribed burn

Priority	Encroachment (%)
1 (High)	>60
2 (Medium)	30-60
3 (Low)	<30

Table 7. Projected revenues and expenses for open range treatments at the Becher Prairie Range Unit.

Task	Scenario	Assumptions	Volume (m3/ha)	Revenue (\$/ha)	Cost/ha (\$/ha)	Net Revenue
Open Range Revenue	1	no merch, slash only				
Harvest		Rev=\$35/m3	0	0		
Expenses						
Slashing		hand slash, low density			125	
Layout		Layout, GPS = 30% treatment			50	
Rehabilitation					0	
Total Expenses					175	
Net Revenue						-175
Breakeven						N/A
Open Range Revenue	2	merch=10 m3/ha sawlogs; 10 m3/ha pulp				
Harvest		Rev=\$35/m3	10	350		
Pulp/chips		Rev=\$31/m3	10	310		
Total			20	660		
Expenses			0			
Slashing		hand slash, moderate density			300	
Layout		include layout, GPS, supervision			50	
Cruise					20	
Harvest		Cost=\$20/m3	10		200	
Trucking		Cost=\$18/m3	10		180	
Rehabilitation		\$100/hr; 5 ha/day			160	
Total Expenses					910	
Net Revenue						-250
Break-even						46
Open Range Revenue	3	merch=30 m3/ha sawlogs; 30 m3/ha pulp				
Harvest		Rev=\$35/m3	30	1050		
Pulp/chips		Rev=\$31/m3	30	930		
Total			60	1980		
Expenses						
Slashing		hand slash, high density			600	
Layout		include layout, GPS, supervision			50	
Cruise		1 plot/4 ha			20	
Harvest		Cost=\$20/m3	30		600	
Trucking		Cost=\$18/m3	30		540	
Rehabilitation		\$100/hr; 5 ha/day			160	
Total Expenses					1970	
Net Revenue						10
Breakeven						33

Ecosystem restoration treatments need to be viewed as stand-tending operations on sites that have not had the necessary maintenance. Incentives are required to improve the economics of treating these sites so that outside funding is not required.

The most viable incentives are to set stumpage for timber and salvage material at the upset rate, and allow harvest into the forest edge. In this way harvest/stand-tending contractors can find enough volume to make the operation viable. Projected costs and revenue, based on figures available at the time of this report (March, 2008) demonstrate that with the addition of volume from the encroachment area and the forest margin it is possible to offset costs, and potentially generate net revenue from these TUs (Table 7). Commercial and non-commercial treatments should be linked so that all operations are completed in one pass.

The ecosystem restoration program will benefit from the cost recovery. Revenue from forest products harvested in encroachment areas and the forest edge can potentially pay for treatment of the encroachment area. The use of a Non-Renewable Forest License should be investigated to accomplish these objectives. These actions have found success in the East Kootenay on ecosystem restoration projects on Crown land, Non-government organization (NGO) lands and in Provincial Parks.

5.5 Treatment Prescriptions

Treatment options within the grassland matrix will vary according to the nature, type and extent of forest encroachment. In general, prescriptions will harvest or remove all live coniferous trees in Layer 1 within the benchmark area except:

- Retain 90 to 100% of veteran trees. These trees are generally >140 years of age. If no veteran trees are present in the grassland matrix, then there is no retention requirement.
- Retain an additional one to four recruitment trees >12.5 cm dbh for recruitment purposes. Recruitment trees should ideally be located adjacent to veterans in a retention clump.

In the retention portion of a TU a basal area of 15 to 25 m²/ha, representing the largest 1/3 of the available trees, will be reserved from harvest. The objective with retention zones is to set up the TU so that desired forest stocking can be maintained with prescribed fire. In order to accomplish this objective, retention areas must also be treated in order to prevent crown fires. These areas will be treated by:

- harvesting up to 2/3 of the available Layer 1 and 2 trees
- salvaging grey or red-attack lodgepole pine where viable
- commercial thinning from below (spacing treatments)
- spacing or slashing Layer 3 to 5 trees
- light under-story burning to control Layer 4 and 5 trees

On all portions of each TU, biodiversity, wildlife and riparian values and integrity will be preserved or enhanced by:

- Snag retention - promote by maintaining at least five snags/ha of the largest available trees. All trees with stick nests or signs of recent cavity nesting will be maintained. Ideally, all conifers >35 cm dbh, and deciduous trees >20 cm dbh will be reserved. No-work zones should be used where such trees exist in patches.
- Reserve aspen patches - minimize damage to live aspen to reduce the potential for suckering and to retain high habitat values.
- Riparian buffer zones – maintain shade and habitat values on all wetland, shallow water and lake ecosystems. No-harvest riparian reserves (minimum 10 m) and management zones (minimum 20 m) should be in place around all riparian features. The Riparian Management Zone should equal 30 m.

5.6 Harvest and Access Disturbance

Soils in the Becher Prairie Range Unit are most commonly loams derived from morainal deposits (Appendix 3). However, texture is variable among soil associations and can range from sandy loam to silty clay loams (Lord and Walmsley 1988). For this reason, treatments must avoid soil disturbance where possible. These actions will minimize soil compaction, soil erosion, soil sterilization, limit run-off, and reduce the potential for invasion by weedy species. Soils are especially susceptible to disturbance if harvesting, trucking and prescribed fire operations are not conducted properly. Some TUs may require archeological surveys. Specific actions are:

- Do not locate new roads or landings in grassland areas
- Load, unload and maintain equipment on landings only
- Limit the operation of tracked or wheeled equipment to frozen soils
- Do not create bladed trails in harvest blocks or on adjacent grasslands
- Construct fire breaks (where necessary) within forested areas only
- Reserve topsoil separately when constructing temporary roads or fire-guards
- Minimize machine operation in reserve areas
- Pile and burn slash and harvest debris unless the MOFR requires well-distributed slash to facilitate prescribed fire. Restrict piles to approximately 40 m²
- Situate piles so as not to affect residual overstory trees and retention patches
- Minimize burning or heat scorching residual overstory trees and retention patches

5.7 Non-Commercial Treatments

Some TUs will require maintenance treatments only in the form of knockdown, tree falling, slashing and prescribed fire (Appendix 3, 5). The most efficient approach to ecosystem restoration is a one-pass system where all operations are combined and applied where necessary. Stratification, target results and disturbance cautions are similar to the commercial treatments.

5.8 Forest Health

Forest health strategies for areas such as the Becher Prairie Range Unit that have experienced severe forest health consequences as a result of agents like the mountain pine beetle are limited to salvage and future prevention. It has been documented that lodgepole pine has encroached onto these grasslands, likely as a consequence of heavy, stress-

induced cone crops followed by years of above average precipitation (Ross 1997). Older stands from encroachment events that took place 20 to 40 years ago (Layers 3 and 4) are typically at the red-attack stage at Becher Prairie (Appendix 3, 5). Layer 1 and 2 trees were almost always at the grey-attack stage. In contrast, Layer 4 and 5 trees that are <2 m in height are uniformly green. It is likely that the intensity of the mountain pine beetle epidemic in this range unit will subside in the short-term as suitable host trees have almost been exhausted. However, if these surviving encroachment trees are not treated, there is the potential for the cycle to repeat. The most practical solution to avert future mountain pine beetle infestation is to remove lodgepole pine in all layers from grasslands.

Douglas-fir is found throughout the Becher Prairie Range Unit, but is most common at higher elevation areas (Appendix 3, 5). Various pests were observed for this species also. Trees that are moisture-stressed, such as those encroaching onto grasslands, are more likely to attract forest pests. Strategies to improve the health of Douglas-fir trees begin with removing encroachment from grassland sites. Other measures include reducing forest stocking levels in adjacent CF blocks with partial-cutting techniques, and by not allowing these forests overstock.

Treatment prescriptions should carefully consider and include actions to prevent and deal with future forest health issues by:

- Timing harvest to optimize drying time for slash
- Employing lop and scatter techniques to facilitate fuel drying for prescribed fire
- Establishing burning/bucking diameter limits for Douglas-fir
- Possible use of anti-aggregation pheromones
- Post-treatment monitoring
- Other actions recommended by MOFR forest health staff

5.9 Invasive Plants

Invasive plants were noted on the Becher Prairie Range Unit, but were most commonly nuisance weeds (Appendix 3). Noxious weed species such as spotted knapweed and Canada thistle have been recorded on the IAPP site. Treatment prescriptions should carefully consider and include actions to prevent and deal with potential risk for invasive plants following harvest treatment.

Soil disturbance is the most prominent method of encouraging the spread of invasive plant species. Treatment recommendations to minimize soil disturbance listed above apply here. Other actions include ensuring harvesting equipment is clean before working on a particular site.

Actions to deal with the risk of invasive species should include:

- Consultation with local weed experts
- Following applicable sections of the Invasive Plant Council of BC's recommendations for forest harvesting operations (2007)

5.10 Livestock and Ungulate Management

Forage use by livestock, in particular, and to a lesser extent by wild ungulates is impacted by forest encroachment as grazing and browsing pressure is concentrated on an ever-decreasing area in grassland and open forest. In effect, forest encroachment increases stocking rate without a corresponding increase in forage production. This can cause a general loss of the more palatable grasses, forbs and shrubs, short-term proliferation of "increaser" species (sub-dominants in the plant community), with subsequent losses in production and palatability. Ultimately, there is the potential for severe downgrading of the plant community to weedy species with ultimate loss of seed sources, genetic variation and general biodiversity. For large livestock and wild ungulates, this results in reduced carrying capacity, and potential decline in the value of these habitat types as wildlife winter and spring range.

Newly treated areas are attractive to livestock and wild ungulates. Mule deer will use newly logged areas in Douglas-fir blocks almost immediately in winter as they select for arboreal lichens and foliage from upper branches. Mule deer winter diets may contain 60 to 95% Douglas-fir (Dawson et al 1990, Wikeem and Ross 2002). Dawson et al (1990) found that deer preferred forage from trees >40 cm dbh and rarely used foliage from trees <6 cm dbh. Differences in the levels of foliar essential oils such as monoterpenes have been hypothesized to influence foliage palatability in Douglas-fir trees (Radwan 1978). Armleder and Dawson (1992) recommend the retention of large diameter, mature Douglas-fir trees in mule deer winter range areas for thermal cover, snow interception and forage production.

Although deer favour browse for the better part of their diet, they also make extensive use of grasses and forbs. Deer use of grasses averages about 10% over the year, but spring use is much higher (Wikeem and Ross 2002). Open grassland areas tend to green-up before forested areas, so this increases the value of OR polygons as spring range.

Cattle use of newly treated areas is influenced by the nature of the treatments. Access is decreased in areas where high amounts of slash have been left. In contrast, palatability of grasses and forbs are increased when prescribed fire has been used to reduce litter and needle-cast accumulations.

Grazing management and ecosystem restoration treatments must be managed concurrently. Sufficient litter must be accumulated in order to create a hot enough fire to kill tree seedlings. If the fire is not hot enough only the bottom branches will be killed. The bark and upper growing points will not be injured and the tree will merely be "fire-proofed" for the next burn. Douglas-fir bark remains photosynthetically active at up to 10 cm outer diameter at ground level (Hall 1976).

6.0 Pre-and Post Operational Monitoring

An important objective of an ecosystem restoration plan is to leave sites in a state where prescribed fire will be the principal maintenance treatment. This will reduce site maintenance costs. Recommended post-treatment stocking would result in nearly 7000 ha in the OR class (Table 8). Most of the TUs (36 of 40) within the grassland benchmark area should remain in OR stocking. Therefore, monitoring is essential to ensure forest encroachment does not re-establish in the grassland benchmark area, and to decide when to re-treat individual TUs.

6.1 Maintenance Treatments

Managers should plan to treat new conifer regeneration before it reaches 1 m in height to maximize treatment effectiveness. Re-treatment date should be scheduled for each site using the best available information, and revised as new information becomes available. Forest health and regeneration surveys should be initiated as a component of the pre- and post-treatment monitoring plan.

6.2 Range Survey

There are approximately 25 range reference areas in the Becher Prairie Range Unit containing both grazed and ungrazed (exclosures) sites. These range inventory plots should be re-sampled where applicable. Rare plant surveys may be considered at this time as well. Additionally, utilization checks should be performed as a part of post-treatment monitoring to discern if livestock distribution and forage use patterns have been affected.

6.3 Invasive Plants

Soil disturbance and the potential introduction of new species from contaminated equipment are potential concerns with ecosystem restoration activities. Surveys should be initiated as a component of the pre- and post-treatment monitoring plan.

6.4 Wildlife

Surveys for species other than large ungulates should be initiated as a component of the pre- and post-treatment monitoring plan. Long-billed curlew, Lewis' woodpecker, bobolink, flammulated owl, sharp-tailed grouse and badger are some of the species that if present, would be expected to benefit from ecosystem restoration activities.

Sharp-tailed grouse are known to populate the range unit. Surveys conducted in 1993 located dancing grounds near Drummond Lake and on the Meldrum Creek Forest Service Road, but not in the open grassland (Ritcey 1995). This author felt that numbers were declining in the range unit, but notes sharp-tailed grouse population increases in the Chilcotin region are mostly associated with clearcut logging of lodgepole pine.

Recent surveys located a dancing ground in an area of Becher Middle to the northeast of Rock Lake (TU4) that was treated with prescribed fire in 2006 (Julie Steciw, SAR biologist, BC Ministry of Environment, pers. comm.). It has been monitored since that time to determine the after-effects of reducing the grass height in that area. Ecosystem restoration activities should increase the suitable habitat area for sharp-tailed grouse.

Table 8. Post-treatment forest cover classes at the Becher Prairie Range Unit.

Pasture	Open	Open Range/	Open	Closed	Wetland	Water	Private	Total	Total (less PL)
	Range	Open Forest	Forest	Forest			Land		
-----ha-----									
TLC Bull	47	0	0	84	0	0	127	258	132
Leech Lake	140	0	0	78	0	3	0	221	221
Till Lake	325	118	0	1002	1	27	2	1476	1474
Becher East	221	277	0	1880	3	24	689	3095	2406
Sword Creek	88	66	0	71	12	5	127	369	242
Becher Middle	2998	0	0	1654	5	77	90	4822	4733
Holding Ground	130	0	0	11	0	1	0	142	142
Military Reserve	2175	0	0	3373	0	247	0	5794	5794
Becher West	722	0	0	785	12	9	1272	2800	1528
Grazing Lease #1	51	0	0	13	0	1	0	65	65
Grazing Lease #2	28	0	0	0	0	0	0	28	28
Grazing Lease #3	23	0	0	5	4	0	0	32	32
Total by Class	6948	461	0	8957	36	394	2307	19102	16796

Permanent Range (ha) = (Open Range + Open Range/Open Forest + Open Forest)/Range Unit Total = 7409

Permanent Range (%) = (Open Range + Open Range/Open Forest + Open Forest)/Range Unit Excluding PL = 44

Distribution (%)	Range Unit (excluding PL)	Permanent Range
Open Range	41	94
Open Range/Open Forest	3	6
Open Forest	0	0
Closed Forest	53	0
Wetlands	0	0
Water	2	0
	100	100

7.0 Summary and Recommendations

The Becher Prairie Range encompasses slightly more than 19,000 ha, including Private Land holdings of about 2300 ha. Approximately 16,800 ha were surveyed as the background for the development of an Ecosystem Restoration Strategic Plan.

Grassland and open forest contained within the grassland benchmark area totals approximately 7400 ha, or about 44% of the range unit. Forest encroachment was verified on more than 3700 ha, indicating one-half of the grassland benchmark area is in need of ecosystem restoration treatments. Nearly 40% of OR polygons are affected, but encroachment has affected 72 and 95% of TUs in the OR/OF and the OF classes, respectively.

The Richardson's needlegrass leading range type (Type 4) is dominant in the grassland benchmark area, but the bluebunch wheatgrass leading type (Type 3) is also important. These range types are mainly found in open grassland and open forest areas. Pinegrass (Type 5) dominates the herbaceous layer in closed forest polygons, but plant species from Types 3 and 4 are commonly found along the grassland/forest ecotone. These range types correspond to some plant communities that are red- and blue-listed in BC (Appendix 2). Activities such as forest harvest, stand-tending, prescribed fire and grazing/browsing management are the most likely methods of restoring these communities. The assortment of red- and blue-listed wildlife species that potentially use these plant communities will also benefit from restoration activities.

Restoration treatments can be classed as commercial and non-commercial. Forest products available as a result of commercial treatments include sawlogs, post and rail material, grape stakes, pulpwood, pulp and OSB chips and hog-fuel. The economics vary among TUs, but revenue from these products can be used as cost recovery for non-commercial treatments. Some harvesting will be required beyond the grassland benchmark. Non-renewable Forest Licenses may be the best vehicle to initiate treatments in the grassland benchmark area. Harvest and stand-tending contractors will need incentive in order to make operations viable. This incentive will be provided by allowing operators to salvage forest products where found, and this proposition is most attractive when stumpage is at the upset rate.

Strategic Plans to restore grasslands in the benchmark area will require a cooperative approach between government, tenure holders and forest harvest/stand-tending contractors. Dedication of resources to initiate these plans, and the willingness of all participants to move toward an adaptive management philosophy, are the key elements in managing grasslands and forest within the grassland benchmark area.

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9.0 Appendices.

Appendix 1. Plant Species

Latin Name	Common Name
<i>Abies lasiocarpa</i> , ABLA, 4	White fir
<i>Achillea millefolium</i> , ACMI, 2	Western yarrow
<i>Agropyron cristatum</i> , AGCR, 1	Crested wheatgrass
<i>Agropyron spicatum</i> , AGSP, 1	Bluebunch wheatgrass
<i>Agropyron trachycaulum</i> , AGTR, 1	Slender wheatgrass
<i>Antennaria dimorpha</i> , ANDI, 2	Low pussytoes
<i>Antennaria microphylla</i> , ANMI, 2	Rosy pussytoes
<i>Anemone multifida</i> , ANMU, 2	Pacific anemone
<i>Artemesia frigida</i> , ARFR, 2	Pasture sage
<i>Arnica cordifolia</i> , ARCO, 2	Orange arnica
<i>Arabis holboellii</i> , ARHO, 2	Holboell's rockcress
<i>Arctostaphylos uva-ursi</i> , ARUV, 3	Bearberry
<i>Aster conspicuous</i> , ASCO, 2	Showy aster
<i>Astragalus miser</i> , ASMI, 2	Timber milkvetch
<i>Betula glandulosa</i> , BEGL, 3	Bog-birch
<i>Calamagrostis rubescens</i> , CARU, 1	Pinegrass
<i>Carex</i> spp., CARX, 1	Sedge
<i>Cerastium arvense</i> , CEAR, 2	Chickweed
<i>Cirsium hookerianum</i> , CIHO, 2	Hooker's thistle
<i>Chrysothamnus nauseosus</i> , CHNA, 3	Rabbitbrush
<i>Danthonia intermedia</i> , DAIN, 1	Timber oatgrass
<i>Festuca ovina</i> , FEOV, 1	Sheep fescue
<i>Geranium viscosissimum</i> , GEVI, 2	Sticky geranium
<i>Geum triflorum</i> , GETR, 2	Old man's whiskers
<i>Heuchra cylindrica</i> , HECY, 2	Alum root
<i>Juniper communis</i> , JUCO, 3	Common juniper
<i>Koeleria cristata</i> , KOCR, 1	Prairie junegrass
<i>Linnaea borealis</i> , LIBO, 2	Twinflower
<i>Penstemon fruticosa</i> , PEFR, 2	Shrubby penstemon
<i>Physocarpus malvaceus</i> , PHMA, 3	Ninebark
<i>Pinus contorta</i> , PICO, 3	Lodgepole pine
<i>Pinus ponderosa</i> , PIPO, 3	Ponderosa pine
<i>Picea</i> spp., PISP, 3	Spruce
<i>Potentilla gracilis</i> , POGR, 2	Slender cinquefoil
<i>Potentilla hippiana</i> , POHI, 2	Cinquefoil
<i>Potentilla recta</i> , PORE, 2	Sulphur cinquefoil
<i>Poa pratensis</i> , POPR, 1	Kentucky bluegrass
<i>Poa sandbergii</i> , POSA, 1	Sandberg bluegrass
<i>Populus tremuloides</i> , POTR, 3	Trembling aspen
<i>Pseudotsuga menziesii</i> , PSME, 3	Douglas-fir

Appendix 1. (cont'd)

Latin Name

Common Name

Rhianthus minor,RHMI,2

Yellow rattle

Rosa spp.,ROSA,3

Rose species

Shepherdia canadensis,SHCA,3

Soopolallie

Solidago spathulata,SOSP,2

Dune goldenrod

Stipa comata,STCO,1

Needle-and-thread

Stipa occidentalis,STOC,1

Western needlegrass

Stipa richardsonii,STRI,1

Richardson's needlegrass

Stipa spartea,STSP,1

Porcupine grass

Tragopogon pratense,TRPR,2

Goatsbeard

Appendix 1. cont'd		
Scientific Name	Common Name	Status
<i>Allium geyeri</i> var. <i>tenerum</i>	Geyer's onion	Blue
<i>Arabis holboellii</i> var. <i>pinetorum</i>	Holboell's rockcress	Blue
<i>Arabis sparsiflora</i>	sickle-pod rockcress	Red
<i>Arnica chamissonis</i> ssp. <i>incana</i>	meadow arnica	Blue
<i>Atriplex argentea</i> ssp. <i>argentea</i>	silvery orache	Red
<i>Atriplex truncata</i>	wedgescale orache	Red
<i>Carex heleonastes</i>	Hudson Bay sedge	Blue
<i>Carex hystrix</i>	porcupine sedge	Blue
<i>Carex simulata</i>	short-beaked fen sedge	Blue
<i>Carex sprengei</i>	Sprengel's sedge	Red
<i>Chamaerhodos erecta</i> ssp. <i>nuttallii</i>	American chamaerhodos	Blue
<i>Entosthodon rubiginosus</i>	rusty cord-moss	Red
<i>Epilobium ciliatum</i> ssp. <i>watsonii</i>	purple-leaved willowherb	Blue
<i>Glyceria pulchella</i>	slender mannagrass	Blue
<i>Hesperostipa spartea</i>	Porcupinegrass	Red
<i>Myotis thysanodes</i>	Fringed Myotis	Blue
<i>Pellaea gastonyi</i>	Gastony's cliff-brake	Blue
<i>Pinus albicaulis</i>	whitebark pine	Blue
<i>Poa fendleriana</i> ssp. <i>fendleriana</i>	mutton grass	Red
<i>Polygonum polygaloides</i> ssp. <i>kelloggii</i>	Kellogg's knotweed	Blue
<i>Potentilla nivea</i> var. <i>pentaphylla</i>	five-leaved cinquefoil	Blue
<i>Pyrola elliptica</i>	white wintergreen	Blue
<i>Ranunculus pedatifidus</i> ssp. <i>affinis</i>	birdfoot buttercup	Blue
<i>Salix boothii</i>	Booth's willow	Blue
<i>Salix serissima</i>	autumn willow	Blue
<i>Scolochloa festucacea</i>	rivergrass	Red
<i>Silene drummondii</i> var. <i>drummondii</i>	Drummond's campion	Blue
<i>Stuckenia vaginata</i>	sheathing pondweed	Blue

Appendix 1. (con't)	Plant Communities		
Scientific Name	Common Name	Sub-zone	Status
<i>Achnatherum richardsonii</i> Herbaceous Vegetation	spreading needlegrass Herbaceous Vegetation	BGxw2/00 IDFdk1a/93 IDFdk4/00 IDFxm/00	Blue
<i>Artemisia campestris</i> / <i>Hesperostipa curtisetata</i>	northern wormwood / short-awned porcupinegrass	IDFxm/00	Red
<i>Carex atherodes</i> Fen - Marsh	awned sedge Fen - Marsh	BGxw2/Wm03 IDFdk3/Wm03 IDFdk4/Wm03 IDFxm/Wm03	Red
<i>Carex lasiocarpa</i> / <i>Drepanocladus aduncus</i>	slender sedge / common hook-moss	BWBSdk1/Wf05 IDFdk3/Wf05 IDFdk4/Wf05 IDFdm2/Wf05	Blue
<i>Deschampsia cespitosa</i> Community	tufted hairgrass Community	IDFdk1/Gs04 IDFdk2/Gs04 IDFdk3/Gs04 IDFdk4/Gs04 IDFdm1/Gs04 IDFdm2/Gs04 IDFdw/Gs04	Blue
<i>Eleocharis palustris</i> Herbaceous Vegetation	common spike-rush	BGxw2/Wm04	Blue
<i>Equisetum fluviatile</i> - <i>Carex utriculata</i>	swamp horsetail - beaked sedge	BGxh2/Wm02	Blue
<i>Juncus balticus</i> - <i>Carex praegracilis</i>	Baltic rush - field sedge	BG/Gs03 IDFdk1/Gs03 IDFdk2/Gs03 IDFdk3/Gs03 IDFdk3/W3 IDFdk4/Gs03 IDFdm1/Gs03 IDFdm2/Gs03 IDFdw/Gs03 PP/Gs03	Blue
<i>Picea engelmannii</i> x <i>glauca</i> / <i>Pleurozium schreberi</i> - <i>Brachythecium</i> spp.	hybrid white spruce / red-stemmed feathermoss - ragged-mosses	IDFdk4/09	Blue
<i>Picea engelmannii</i> x <i>glauca</i> / <i>Rosa acicularis</i> / <i>Aralia nudicaulis</i>	hybrid white spruce / prickly rose / wild sarsaparilla	IDFdk3/08	Blue
<i>Picea engelmannii</i> x <i>glauca</i> / <i>Rosa acicularis</i> / <i>Carex concinna</i>	hybrid white spruce / prickly rose / low northern sedge	IDFdk3/07	Blue
<i>Picea engelmannii</i> x <i>glauca</i> / <i>Rosa acicularis</i> / <i>Petasites frigidus</i> var. <i>palmatus</i>	hybrid white spruce / prickly rose / palmate coltsfoot	IDFxm/08 IDFxw/07	Red
<i>Populus tremuloides</i> / <i>Achnatherum richardsonii</i> - <i>Geum triflorum</i>	trembling aspen / spreading needlegrass - old man's whiskers	BGxw2/00 IDFxm/00	Red
<i>Pseudoroegneria spicata</i> - <i>Balsamorhiza sagittata</i>	bluebunch wheatgrass - arrowleaf balsamroot	IDFxh1a/93 IDFxm/00 PPdh1/03 PPxh1/00K	Red
<i>Pseudoroegneria spicata</i> - <i>Koeleria macrantha</i>	bluebunch wheatgrass - junegrass	BGxh1/00 BGxh3/00 BGxw1/01 BGxw2/01 IDFdk1a/92 IDFdk3/00 IDFdm1/02 IDFun/00 IDFxh2a/00 IDFxh2a/92 IDFxm/00	Red

Appendix 1. (con't)	Plant Communities		
Scientific Name	Common Name	Sub-zone	Status
<i>Pseudotsuga menziesii</i> / <i>Juniperus communis</i> / <i>Cladonia</i> spp.	Douglas-fir / common juniper / clad lichens	IDFxm/03	Red
<i>Pseudotsuga menziesii</i> / <i>Juniperus scopulorum</i> / <i>Arctostaphylos uva-ursi</i>	Douglas-fir - Rocky Mountain juniper / kinnikinnick	IDFdk3/02	Red
<i>Pseudotsuga menziesii</i> / <i>Juniperus scopulorum</i> / <i>Artemisia frigida</i>	Douglas-fir - Rocky Mountain juniper / prairie sagewort	IDFdk4/03 IDFdk4/04 IDFxm/04	Blue
<i>Pseudotsuga menziesii</i> / <i>Juniperus scopulorum</i> / <i>Penstemon fruticosus</i>	Douglas-fir - Rocky Mountain juniper / shrubby penstemon	IDFdk3/03 IDFdk4/02 IDFxm/02	Blue
<i>Pseudotsuga menziesii</i> / <i>Juniperus scopulorum</i> / <i>Pseudoroegneria spicata</i>	Douglas-fir - Rocky Mountain juniper / bluebunch wheatgrass	IDFxm/01	Blue
<i>Pseudotsuga menziesii</i> - <i>Pinus ponderosa</i> / <i>Pseudoroegneria spicata</i> - <i>Calamagrostis rubescens</i>	Douglas-fir - ponderosa pine / bluebunch wheatgrass - pinegrass	IDFdk2/02 IDFdm1/03 IDFxm1/03 IDFxm2/04 IDFxm/02	Blue
<i>Pseudotsuga menziesii</i> / <i>Pleurozium schreberi</i> - <i>Hylocomium splendens</i>	Douglas-fir / red-stemmed feathermoss - step moss	IDFdk3/05 IDFdk4/07 IDFxm/05 IDFxm/06 SBSdk/04	Blue
<i>Pseudotsuga menziesii</i> / <i>Pseudoroegneria spicata</i> - <i>Achnatherum occidentale</i>	Douglas-fir / bluebunch wheatgrass - stiff needlegrass	IDFdk3/04	Blue
<i>Pseudotsuga menziesii</i> / <i>Pseudoroegneria spicata</i> - <i>Calamagrostis rubescens</i>	Douglas-fir / bluebunch wheatgrass - pinegrass	IDFdk4/05	Blue
<i>Pseudotsuga menziesii</i> / <i>Rosa acicularis</i> / <i>Aralia nudicaulis</i>	Douglas-fir / prickly rose / wild sarsaparilla	IDFxm/07	Red
<i>Puccinellia nuttalliana</i> - <i>Hordeum jubatum</i>	Nuttall's alkaligrass - foxtail barley	IDFdk1/Gs02 IDFdk2/Gs02 IDFdk3/Gs02 IDFdk4/Gs02	Red
<i>Salix maccalliana</i> / <i>Carex utriculata</i>	MacCalla's willow / beaked sedge	IDFdk3/Ws05 IDFdk4/Ws05	Blue
<i>Salix</i> spp. / <i>Carex sartwelli</i>	tall willows / Sartwell's sedge	IDFdk3/W6	Blue
<i>Schoenoplectus acutus</i> Deep Marsh	hard-stemmed bulrush Deep Marsh	IDFdk3/W14	Blue
<i>Sporobolus cryptandrus</i> - <i>Hesperostipa comata</i>	sand dropseed - needle-and-thread grass	BGxm3/00 BGxm2/00 IDFxm/00 IDFxm/00	Red
<i>Triglochin maritima</i> Marsh	seaside arrow-grass Marsh	IDFdk3 MSxv SBPSxc	Red
<i>Typha latifolia</i> Marsh	common cattail Marsh	IDFdk3/Wm05 IDFdm2/Wm05 PPxm1/Wm05	Blue

Appendix 2. Animal species.		
Scientific Name	Common Name	Status
<i>Acipenser transmontanus</i> pop. 6	White Sturgeon (Middle Fraser River Population)	Red
<i>Aechmophorus occidentalis</i>	Western Grebe	Red
<i>Ardea herodias herodias</i>	Great Blue heron, <i>herodias</i> subspecies	Blue
<i>Asio flammeus</i>	Short-eared Owl	Blue
<i>Bartramia longicauda</i>	Upland Sandpiper	Red
<i>Botaurus lentiginosus</i>	American Bittern	Blue
<i>Corynorhinus townsendii</i>	Townsend's Big-eared Bat	Blue
<i>Dolichonyx oryzivorus</i>	Bobolink	Blue
<i>Euderma maculatum</i>	Spotted Bat	Blue
<i>Falco mexicanus</i>	Prairie Falcon	Red
<i>Falco peregrinus anatum</i>	Peregrine Falcon, <i>anatum</i> subspecies	Red
<i>Grus canadensis</i>	Sandhill Crane	Blue
<i>Gulo gulo luscus</i>	Wolverine, <i>luscus</i> subspecies	Blue
<i>Hirundo rustica</i>	Barn Swallow	Blue
<i>Magnipelta mycophaga</i>	Magnum Mantleslug	Blue
<i>Martes pennanti</i>	Fisher	Blue
<i>Melanerpes lewis</i>	Lewis's Woodpecker	Red
<i>Myotis ciliolabrum</i>	Western Small-footed Myotis	Blue
<i>Myotis thysanodes</i>	Fringed Myotis	Blue
<i>Numenius americanus</i>	Long-billed Curlew	Blue
<i>Otus flammeolus</i>	Flammulated Owl	Blue
<i>Ovis canadensis</i>	Bighorn Sheep	Blue
<i>Salvelinus confluentus</i>	Bull Trout	Blue
<i>Taxidea taxus</i>	Badger	Red
<i>Tympanuchus phasianellus columbianus</i>	Sharp-tailed Grouse, <i>columbianus</i> subspecies	Blue
<i>Ursus arctos</i>	Grizzly Bear	Blue

Appendix 3. Plant communities at the Becher Prairie Range in August, 2007.

Pasture Site Airphoto	Elev Aspect Slope	Forest Cover Class	Trees Species	Cover	Shrubs Species	Cover	Grasses Species	Cover	Forbs Species	Cover
Leech Lake	945	O/S	Douglas-fir	1-5	snowberry	1-25	Kentucky bluegrass	5-50	goatsbeard	1-10
	290		Trembling aspen	1-5	common juniper	1-10	R. needlegrass	1-10	old man's whiskers	<1
TU1	0-2		Lodgepole pine	1-5	soopolallie	1-2	C. needlegrass	1-5	silky lupine	<1
					prickly rose	<1	smooth brome	1-2	stoneseed	<1
OR		U/S	Trembling aspen	1-25			brome species	1-2	common mullien	<1
			Douglas-fir	1-2			bluebunch wheatgrass	<1	sticky geranium	<1
BCC05032							timber oatgrass	<1	yellow rattle	<1
213		R/G	Lodgepole pine	1-25			Nuttal's alkaligrass	<1	alfalfa	<1
			Trembling aspen	1-10			porcupine grass	<1	alsike clover	<1
WP: 428			Douglas-fir	<1					dune goldenrod	<1
									dandelion	<1
Type 4									western yarrow	<1
									northern bedstraw	<1

NOTES: Landform/Soil: moraine/silt loam. Litt: 25-75, Soil: 5-25, Bryo: 5-25, Range Cond: P-G.

Lodgepole pine r/g mainly on OR margins

Some lodgepole o/s standing dead - red attack.

Some recent (3-5 years) harvest in CF areas - not treated to S of fence

RECOMMENDATIONS: Retain OR stocking. Slash lodgepole pine r/g

POST-TREATMENT STOCKING: OR

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Species	Grasses Species	Forbs Species	Cover	Cover	Cover	
Leech Lake	930	O/S	Douglas-fir	1-5	common juniper	1-2	Kentucky bluegrass	5-50	sulphur cinquefoil	1-2
	070/240		Trembling aspen	1-5	Rocky M. juniper	1-2	R. needlegrass	1-20	goatsbeard	<1
TU2	0-5				prickly rose	1-2	C. needlegrass	1-5	old man's whiskers	<1
		U/S	Trembling aspen	1-50	birch-l. spirea	<1	porcupine grass	1-5	American vetch	<1
OR			Douglas-fir	1-2					yellow rattle	<1
									Norway cinquefoil	<1
BCC05032		R/G	Trembling aspen	1-25					sticky geranium	<1
	213		Lodgepole pine	1-5					Indian paintbrush	<1
			Douglas-fir	<1					showy fleabane	<1
WP: 429									graceful cinquefoil	<1
									dandelion	<1
Type 4									alsike clover	<1

NOTES: Landform/Soil: moraine/silt loam. Litt: 5-75, Soil: 1-25, Bryo: 1-25, Range Cond: P-F.

Polygon #2 is south of the E/W fence splitting the pasture

Some lodgepole o/s and u/s standing dead - red attack.

About 3000-4000 sph PI u/s in 10-20 yr age group

At is clumpy, PI o/s and u/s logged and slashed in past. One piece by road not done, also E of small slough.

Lodgepole pine r/g mainly on OR margins

Some recent (3-5 years) harvest in CF areas - not treated to S of fence

RECOMMENDATIONS: Retain OR stocking and clumps of At. Slash lodgepole pine r/g

POST-TREATMENT STOCKING: OR

PRIORITY: low

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover	Species	Grasses Cover	Species	Forbs Cover	Species	Cover
Till Lake	930	O/S	Trembling aspen	1-10	common juniper	<1	R. needlegrass	1-25	sticky geranium	1-2
	240		Douglas-fir	1-5	Rocky M. juniper	<1	Kentucky bluegrass	1-25	old man's whiskers	<1
TU1	0-10	U/S	Lodgepole pine	1-10	prickly rose	<1	C. needlegrass	1-5	yellow rattle	<1
					snowberry	<1	porcupine grass	1-5	dune goldenrod	<1
OR		R/G	Lodgepole pine	1-25			timber oatgrass	1-2	alsike clover	<1
									goatsbeard	<1
BCC05032	213								American vetch	<1
									creamy peavine	<1

WP: 430

Type 4

NOTES: Landform/Soil: moraine/silt loam. Litt: 50-75, Soil: 0-5, Bryo: 0-5, Range Cond: P-F.

To S of Leech Pasture.

All PI o/s dead, u/s > 4m in height dead also.

CF areas within the polygon are At with a few Fd - usually located in depressions.

RECOMMENDATIONS: Retain OR stocking and clumps of At. Slash lodgepole pine r/g

POST-TREATMENT STOCKING: OR

PRIORITY: medium

Appendix 3. (cont'd).

Pasture Site Airphoto	Elev Aspect Slope	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species				
Till Lake	930	O/S	Douglas-fir	1-10	prickly rose	1-2	Kentucky bluegrass	5-50	timber milkvetch	<1
	270		Trembling aspen	1-5	snowberry	1-2	R. needlegrass	5-25	rosy pussytoes	<1
TU2	0-10				common juniper	<1	C. needlegrass	1-5	old man's whiskers	<1
OF		U/S	Lodgepole pine	1-10	Rocky M. juniper	<1	porcupine grass	1-2	yellow rattle	<1
							timber oatgrass	<1	goatsbeard	<1
BCC05032		R/G	Lodgepole pine	1-25					northern bedstraw	<1
211									stoneseed	<1
									silverweed	<1
WP: 431									wild strawberry	<1
									yellow hedysarum	<1
Type 4									western yarrow	<1

NOTES: Landform/Soil: moraine/silt loam. Litt: 50-75, Soil: 1-5, Bryo: 1-5 (25), Range Cond: P-F.

To SE of Till Lake. Series of OR with CF o/s composed of dead PI and live At and Fd.

Joins between two small, shallow lakes to SE of Till Lake. A few glacial erratics.

All PI o/s dead due to mountain pine beetle red attack - other forest health issues - pitch twig moth, mistletoe, catface.

PI u/s red/green attack - dying also - age 30-40 years.

Poor range condition near lakes.

RECOMMENDATIONS: Retain OR stocking and clumps of At. Slash lodgepole pine r/g and u/s

POST-TREATMENT STOCKING: OR

PRIORITY: high

Appendix 3. (cont'd).

Pasture Site Airphoto	Elev Aspect Slope	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species			
Till Lake	920 90	O/S	Spruce Douglas-fir	1-10 1-5	common juniper <1	Kentucky bluegrass Inland saltgrass timber oatgrass Baltic rush	1-25 1-25 1-5 1-5	silverweed tarragon curly cup gumweed goatsbeard alsike clover	1-2 <1 <1 <1 <1
TU3	0-10	U/S	Trembling aspen Lodgepole pine	1-5 1-5					
OR									
BCC05032 158		R/G	Lodgepole pine Trembling aspen	1-2 1-2					

WP: 432

Type 2

NOTES: Landform/Soil: moraine/silt loam. Litt: 25-50, Soil: 1-10, Bryo: 1-10, Range Cond: P.

Small holding area around small lentic wetland.

Fringed on W side with spruce and on E side with PI and At.

Upland is open grassland and alkaline meadow around wetland (marsh).

RECOMMENDATIONS: Retain OR stocking and clumps of At. Slash lodgepole pine r/g

POST-TREATMENT STOCKING: OR

PRIORITY: low

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species				
Till Lake	990	O/S	Douglas-fir	1-20	prickly rose	1-2	Kentucky bluegrass	5-50	goatsbeard	1-10
	230		Trembling aspen	1-5	saskatoon	<1	R. needlegrass	5-25	old man's whiskers	1-2
TU4	0-5				common juniper	<1	bluebunch wheatgrass	1-10	sticky geranium	1-2
		U/S	Trembling aspen	1-25			porcupine grass	1-5	northern bedstraw	<1
OR									western yarrow	<1
		R/G	Lodgepole pine	1-5					American vetch	<1
BCC05032			Trembling aspen	1-2					alsike clover	<1
160			Douglas-fir	<1					silverweed	<1
WP: 437									wild strawberry	<1
Type 3									graceful cinquefoil	<1
									timber milkvetch	<1
									tarragon	<1

NOTES: Landform/Soil: moraine/silt loam. Litt: 50-75, Soil: 1-25, Bryo: 1-10, Range Cond: F-G.

Most ingrowth and encroachment is on the margins. PI dominates r/g.

PI - o/s and u/s are dead, r/g up to 1 m in height survives.

Sections have been grazed heavily in the past - goatsbeard very dense in places. Portions with heavy litter and very little grass.

Grassland plant extend well into forest (pre-1962).

RECOMMENDATIONS: Slash lodgepole pine r/g on margins and necks of OR.

POST-TREATMENT STOCKING: OR

PRIORITY: medium

Appendix 3. (cont'd).

Pasture Site Airphoto	Elev Aspect Slope	Forest Cover Class	Trees Species	Cover	Shrubs Species	Cover	Grasses Species	Cover	Forbs Species	Cover
Till Lake	1040	O/S	Douglas-fir	1-10	snowberry	1-2	Kentucky bluegrass	5-50	goatsbeard	1-10
	200		Trembling aspen	1-10	prickly rose	<1	R. needlegrass	5-25	dune goldenrod	<1
TU5	0-2				saskatoon	<1	porcupine grass	1-2	northern bedstraw	<1
		U/S	Trembling aspen	1-10	common juniper	<1	bluebunch wheatgrass	<1	western yarrow	<1
OR/OF			Lodgepole pine	1-5			Nuttal's alkaligrass	<1	brown-eyed susan	<1
									silverweed	<1
BCC05032		R/G	Lodgepole pine	1-25					showy fleabane	<1
160			Douglas-fir	<1					timber milkvetch	<1
									sulphur buckwheat	<1
WP: 438									sticky geranium	<1
									stoneseed	<1
Type 4										

NOTES: Landform/Soil: moraine/silt loam. Litt: 50-75, Soil: 1-25, Bryo: 1-10, Range Cond: F.

Thin, alkaline soil over bedrock

At ribboned between P4 and P5. All PI o/s dead (grey), most u/s also. PI r/g generally green.

Fd vets and o/s - good form and vigour. Very few layer 3 and 4.

RECOMMENDATIONS: Slash lodgepole pine r/g wherever found. Harvest Fd sawlogs.

POST-TREATMENT STOCKING: OR/OF

PRIORITY: high

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover	Species	Grasses Cover	Species	Forbs Cover	Species	Cover
Till Lake	1010	O/S	Douglas-fir	1-5	prickly rose	1-2	Kentucky bluegrass	5-25	goatsbeard	1-5
	140		Trembling aspen	1-5	common juniper	<1	R. needlegrass	5-25	dune goldenrod	<1
TU6	0-2	U/S	Lodgepole pine	1-5	snowberry	<1	bluebunch wheatgrass	1-5	wild strawberry	<1
							porcupine grass	1-2	alsike clover	<1
OR		R/G	Lodgepole pine	1-10			timber oatgrass	<1	old man's whiskers	<1
									rosy pussytoes	<1
BCC05032	160							silverweed	<1	
										timber milkvetch
WP: 439								Hooker's thistle	<1	
										tarragon

Type 4

NOTES: Landform/Soil: moraine/silt loam. Litt: 50-75, Soil: 1-25, Bryo: 1-10, Range Cond: F-G.

Unit located to the S of Sword Creek and N of Rock Lake Road.

Trees on margins and in potholes mainly. Several forest clumps dominated by At.

PI o/s and u/s dead, r/g <2m in height still green, but some MPB green attack.

W end of unit has the most dead trees. PI r/g extends about 100 m into the OR.

RECOMMENDATIONS: Slash lodgepole pine r/g wherever found. Prescribed fire.

POST-TREATMENT STOCKING: OR

PRIORITY: high

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover	Species	Grasses Cover	Species	Forbs Cover	Species	Cover
Becher East	930	O/S	Trembling aspen	1-10	common juniper	<1	R. needlegrass	1-25	sticky geranium	1-2
	240		Douglas-fir	1-5	Rocky M. juniper	<1	Kentucky bluegrass	1-25	old man's whiskers	<1
TU1	0-10	U/S	Lodgepole pine	1-10	prickly rose	<1	C. needlegrass	1-5	yellow rattle	<1
					snowberry	<1	porcupine grass	1-5	dune goldenrod	<1
OR/OF		R/G	Lodgepole pine	1-25			timber oatgrass	1-2	alsike clover	<1
									goatsbeard	<1
BCC05032	158, 213								American vetch	<1
									creamy peavine	<1

WP: 430

Type 4

NOTES: Landform/Soil: moraine/silt loam. Litt: 50-75, Soil: 0-5, Bryo: 0-5, Range Cond: P-F.

To S of Leech Pasture. Same feature as P1 Till Lake, but located on the E side of the Meldrum Creek Road.

All PI o/s dead, u/s > 4m in height dead also.

CF areas within the polygon are At with a few Fd - usually located in depressions.

RECOMMENDATIONS: Retain OR stocking and clumps of At. Slash lodgepole pine r/g

POST-TREATMENT STOCKING: OR

PRIORITY: medium

Appendix 3. (cont'd).

Pasture Site Airphoto	Elev Aspect Slope	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species				
Becher East	920	O/S	Spruce	1-10	common juniper	<1	Kentucky bluegrass	1-25	silverweed	1-2
	90		Douglas-fir	1-5			Inland saltgrass	1-25	tarragon	<1
TU2	0-10						timber oatgrass	1-5	curly cup gumweed	<1
		U/S	Trembling aspen	1-5			Baltic rush	1-5	goatsbeard	<1
OR			Lodgepole pine	1-5					alsike clover	<1
BCC05032		R/G	Lodgepole pine	1-2						
158			Trembling aspen	1-2						

WP: 432

Type 2

NOTES: Landform/Soil: moraine/silt loam. Litt: 25-50, Soil: 1-10, Bryo: 1-10, Range Cond: P.

TU is part Crown, part grazing lease.

Small holding area around small lentic wetland.

Fringed on W side with spruce and on E side with PI and At.

Upland is open grassland and alkaline meadow around wetland (marsh).

RECOMMENDATIONS: Retain OR stocking and clumps of At. Slash lodgepole pine r/g

POST-TREATMENT STOCKING: OR

PRIORITY: low

Appendix 3. (cont'd).

Pasture Site Airphoto	Elev Aspect Slope	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species				
Becher East	930	O/S	Trembling aspen	1-5	common juniper	<1	R. needlegrass	5-25	silverweed	<1
	240		Douglas-fir	1-5	prickly rose	<1	timber oatgrass	1-15	tiny penstemon	<1
TU3	0-5						C. needlegrass	1-5	dune goldenrod	<1
OR		U/S	Lodgepole pine	1-15			porcupine grass	1-5	yellow rattle	<1
							western wheatgrass	1-2	pasture sage	<1
BCC05032		R/G	Lodgepole pine	1-2					goatsbeard	<1
158									northern bedstraw	<1
									rosy pussytoes	<1
WP: 433									graceful cinquefoil	<1
									American vetch	<1
Type 4									field peppergrass	<1
									sulphur buckwheat	<1
									stoneseed	<1
									sticky geranium	<1

NOTES: Landform/Soil: moraine/silt loam. Litt: 75-95, Soil: 1-5, Bryo: 1-5, Range Cond: F-E.

Ag lease within Becher E

Stipa grassland

PI r/g distributed throughout unit at low % cover. Margins have dead PI in all layers.

RECOMMENDATIONS: Retain OR stocking and clumps of At. Slash lodgepole pine r/g

POST-TREATMENT STOCKING: OR

PRIORITY: medium

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species				
Becher East	960	O/S	Trembling aspen	1-5	common juniper	<1	R. needlegrass	5-25	goatsbeard	<1
	240		Douglas-fir	1-5	prickly rose	<1	Kentucky bluegrass	5-25	dune goldenrod	<1
TU4	0-5				Rocky M. juniper	<1	porcupine grass	1-5	northern bedstraw	<1
		U/S	Trembling aspen	1-5			western wheatgrass	1-2	old man's whiskers	<1
OR/OF			Douglas-fir	1-5					timber milkvetch	<1
									yellow rattle	<1
BCC05032		R/G	Lodgepole pine	1-10					sticky geranium	<1
158			Douglas-fir	1-25					sulphur buckwheat	<1
BCC05034									western yarrow	<1
143									rosy pussytoes	<1
WP: 434										

Type 4

NOTES: Landform/Soil: moraine/silt loam. Litt: 75-95, Soil: 1-5, Bryo: 1-5, Range Cond: G.

Higher elevation site, so more Fd encroachment.

Steep S aspect above PL in S.

Red and green attack on PI o/s and u/s - r/g still green.

Volume in E portio - W side has been harvested.

RECOMMENDATIONS: Open OR areas. Retain Fd and clumps of At. Slash lodgepole pine r/g.

POST-TREATMENT STOCKING: OR/OF

PRIORITY: medium

Appendix 3. (cont'd).

Pasture Site Airphoto	Elev Aspect Slope	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species				
Becher East	950	O/S	Trembling aspen	1-5	common juniper	<1	Kentucky bluegrass	5-50	yellow rattle	<1
	50		Douglas-fir	1-5	prickly rose	<1	R. needlegrass	15-25	northern bedstraw	<1
TU5	0-5				Rocky M. juniper	<1	porcupine grass	1-5	sulphur buckwheat	<1
OR		U/S	Douglas-fir	<1					dune goldenrod	<1
									old man's whiskers	<1
BCC05034		R/G	Douglas-fir	<1					western yarrow	<1
	142									

WP: 435

Type 4

NOTES: Landform/Soil: moraine/silt loam. Litt: 75-95, Soil: 1-5, Bryo: 1-5, Range Cond: G-E.

To S of Ag Lease, W of PL and E of Meldrum Creek Road.

Fd - mostly isolated o/s trees, some ingrowth. No PI seed source in this polygon.

Fd r/g layer is <1% cover, but widely distributed.

RECOMMENDATIONS: Retain Fd and clumps of At o/s. Slash or burn Fd r/g.

POST-TREATMENT STOCKING: OR

PRIORITY: low

Appendix 3. (cont'd).

Pasture Site Airphoto	Elev Aspect Slope	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species				
Becher East	970	O/S	Trembling aspen	1-25	snowberry	<1	Kentucky bluegrass	5-25	goatsbeard	1-5
	260		Douglas-fir	1-10	prickly rose	<1	C. needlegrass	1-5	nodding onion	<1
TU6	0-2						porcupine grass	1-5	sticky geranium	<1
		U/S	Trembling aspen	1-25			R. needlegrass	1-5	alumroot	<1
OR/OF			Douglas-fir	1-5			slender wheatgrass	1-5	sulphur buckwheat	<1
							timber oatgrass	1-5	old man's whiskers	<1
BCC05034		R/G	Lodgepole pine	1-10					sulphur cinquefoil	<1
142			Douglas-fir	<1					timber milkvetch	<1
WP: 436									wild strawberry	<1
									showy fleabane	<1
Type 4									silverweed	<1

NOTES: Landform/Soil: moraine/silt loam. Litt: 75-95, Soil: 1-5, Bryo: 1-5, Range Cond: F.

Partially logged to remove merch PI, reserved Fd. PI u/s slashed at same time.

RECOMMENDATIONS: Remove merch Fd. Slash or burn Fd and PI r/g.

Convert most of polygon to OR - Retain clumps of At o/s.

POST-TREATMENT STOCKING: OR/OF

PRIORITY: high

Appendix 3. (cont'd).

Pasture Site Airphoto	Elev Aspect Slope	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species				
Sword Creek	1000	O/S	Lodgepole pine	<1	prairie rose	1-2	Kentucky bluegrass	5-25	silverweed	1-2
	180				saskatoon	<1	R. needlegrass	1-10	goatsbeard	1-2
TU1	0-2	U/S	Lodgepole pine	1-2	common juniper	<1	porcupine grass	1-5	rosy pussytoes	<1
OR		R/G	Lodgepole pine	1-5			prairie junegrass	1-5	tarragon	<1
BCC05032							C. needlegrass	1-5	western yarrow	<1
							bluebunch wheatgrass	<1	dune goldenrod	<1
160							alkali cordgrass	<1	t. white prairie aster	<1

WP: 441

Type 4

NOTES: Landform/Soil: moraine/silt loam. Litt: 75-95, Soil: 1-5, Bryo: 1-25, Range Cond: F-G.

PI - o/s is grey attack, u/s is red attack. PI - r/g mostly on N margin of unit - not too much across OR - soil too alkaline.

RECOMMENDATIONS: Slash or burn PI r/g on N margin. Work to Fd o/s line in CF. Remove Fd sawlogs for volume.

POST-TREATMENT STOCKING: OR

PRIORITY: low

Appendix 3. (cont'd).

Pasture Site Airphoto	Elev Aspect Slope	Forest Cover Class	Trees Species	Cover	Shrubs Species	Cover	Grasses Species	Cover	Forbs Species	Cover
Sword Creek	1000	O/S	Douglas-fir	1-10	Prairie rose	<1	Kentucky bluegrass	5-25	alsike clover	1-2
	90		Trembling aspen	1-5	common juniper	<1	R. needlegrass	5-25	silverweed	1-2
TU2	1-5						C. needlegrass	1-10	sticky geranium	<1
		U/S	Trembling aspen	1-25			porcupine grass	1-5	northern bedstraw	<1
OR/OF			Douglas-fir	1-5			alkali bluegrass	<1	graceful cinquefoil	<1
									tarragon	<1
BCC05032		R/G	Lodgepole pine	1-10					yellow rattle	<1
160			Douglas-fir	<1					old man's whiskers	<1
WP: 442									brown-eyed susan	<1
Type 4									western yarrow	<1
									showy fleabane	<1
									sulphur buckwheat	<1

NOTES: Landform/Soil: moraine/silt loam. Litt: 75-95, Soil: 1-5, Bryo: 1-25, Range Cond: F-G.

Shallow soils over bedrock - very alkaline.

Area logged in 1990. Forest cover formerly dominated by PI.

Cones on old landings are not germinating - no r/g layer here.

No stumps in areas where o/s trees are <10 m in height.

RECOMMENDATIONS: Clear all of polygon to 1962 line. Remove PI r/g.

Retain as OR and lightly stocked OF.

Retain At and Fd Layer 1.

POST-TREATMENT STOCKING: OR/OF

PRIORITY: medium

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover	Shrubs Species	Grasses Cover	Grasses Species	Forbs Cover	Forbs Species	Cover
Becher M	1010 30	O/S	Douglas-fir	1-5	prickly rose	1-2	R. needlegrass	5-25	old man's whiskers	1-2
			Trembling aspen	1-5	common juniper	<1	Kentucky bluegrass	5-25	sticky geranium	<1
TU1	0-2	U/S	Lodgepole pine	1-2	snowberry	<1	C. needlegrass	1-5	alumroot	<1
							prairie junegrass	1-2	graceful cinquefoil	<1
OR/OF		R/G	Lodgepole pine	1-5			bluebunch wheatgrass	<1	goatsbeard	<1
							porcupine grass	<1	timber milkvetch	<1
BCC05032	160		Trembling aspen	1-2			timber oatgrass	<1	dune goldenrod	<1
			Douglas-fir	<1					northern bedstraw	<1

WP: 440

Type 4

NOTES: Landform/Soil: moraine/silt loam. Litt: 50-75, Soil: 1-5, Bryo: 1-5, Range Cond: G-E.

Better range condition than Till Lake-P6 (same feature). Good litter cover.

Most forest cover is on the margin of the unit. A few Fd.

RECOMMENDATIONS: Slash lodgepole pine r/g wherever found. Prescribed fire for clean-up.

Harvest to Fd o/s line (pre-1962) for some volume.

POST-TREATMENT STOCKING: OR

PRIORITY: high

Appendix 3. (cont'd).

Pasture Site Airphoto	Elev Aspect Slope	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species				
Becher M	1000	O/S	Douglas-fir	1-25	prickly rose	1-2	R. needlegrass	5-50	old man's whiskers	1-2
	90		Trembling aspen	1-5			Kentucky bluegrass	5-50	rosy pussytoes	<1
TU2	0-1						C. needlegrass	1-5	sulphur buckwheat	<1
		U/S	Trembling aspen	1-25			prairie junegrass	1-5	silverweed	<1
OR/OF			Lodgepole pine	1-10			porcupine grass	1-2	goatsbeard	<1
									wild strawberry	<1
BCC05034		R/G	Lodgepole pine	1-10					western yarrow	<1
140									northern bedstraw	<1
BCC05035									t. white prairie aster	<1
4										

WP: 443

Type 4

NOTES: Landform/Soil: moraine/silt loam. Litt: 50-75, Soil: 0-5, Bryo: 0-25, Range Cond: P-F.

Mosaic of OR and OF with a couple of small wetlands.PI - o/s dead, 90% of u/s dead.

PI o/s trees are ~40 years old. Poor tree growing site - low soil moisture and alkaline soils.

Some logging on perimeter in 1980's and ~ 2000 - very little encroachment here. No cones on PI slash.

Some good form Fd trees on margin and ridges within polygon, but low Site Index overall.

RECOMMENDATIONS: Remove remaining PI and poor form Fd - slash to Fd o/s on margin.

Retain CF and At clumps.

Fd overstory on margin for volume.

POST-TREATMENT STOCKING: OR

PRIORITY: high

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species				
Becher M	1010	O/S	Douglas-fir	1-5	prickly rose	1-2	R. needlegrass	5-25	showy fleabane	1-2
	80		Trembling aspen	1-2	saskatoon	<1	Kentucky bluegrass	5-25	sticky geranium	<1
TU3	0-10				common juniper	<1	timber oatgrass	1-5	yellow rattle	<1
		U/S	Trembling aspen	1-15	Rocky M. juniper	<1	C. needlegrass	1-5	brown-eyed susan	<1
OR			Douglas-fir	<1	snowberry	<1	porcupine grass	1-2	old man's whiskers	<1
									goatsbeard	<1
BCC05034		R/G	Lodgepole pine	1-5					t. white prairie aster	<1
140			Trembling aspen	<1					graceful cinquefoil	<1
			Douglas-fir	<1					dune goldenrod	<1
WP: 444									wild strawberry	<1
									northern bedstraw	<1

Type 4

NOTES: Landform/Soil: moraine/silt loam. Litt: 75-95, Soil: 1-2, Bryo: 1-5, Range Cond: G-E.

Includes the Loran 'C' site and the area E of Rock Lake.

PI r/g spread across site. Most Fd r/g located on margins.

Most u/s and o/s trees are on margins.

RECOMMENDATIONS: Remove all r/g on margins and throughout - PI and poor form Fd.

Knockdown and then prescribed fire.

Good polygon to burn - lots of fine fuels and easy to blackline

Fd on margin for volume. Harvest to benchmark on CF between TU3 and TU4.

POST-TREATMENT STOCKING: OR

PRIORITY: medium

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species				
Becher M	1040	O/S	Trembling aspen	1-25	prickly rose	1-5	R. needlegrass	5-25	timber milkvetch	<1
	260		Douglas-fir	1-10	common juniper	<1	Kentucky bluegrass	5-25	dandelion	<1
TU4	0-10						porcupine grass	1-5	chickweed	<1
		U/S	Trembling aspen	1-5			C. needlegrass	1-5	dune goldenrod	<1
OR			Douglas-fir	1-5			crested wheatgrass	1-2	alsike clover	<1
									western yarrow	<1
BCC05034		R/G	Trembling aspen	1-25					silverweed	<1
138			Lodgepole pine	1-10					lamb's quarters	<1
			Douglas-fir	1-5					nodding onion	<1

WP: 445

Type 4

NOTES: Landform/Soil: moraine/silt loam. Litt: 75-95, Soil: 1-5, Bryo: 1-5, Range Cond: G-E.

Large OR area to N of Rock Lake.

Overstory trees, especially At are clumpy within the polygon. All PI are grey attack.

Fd dominated CF polygon between P3 and P4.

The E margin to the N of the Rock Lake Road has been hand-slashed - all margins need similar treatment.

RECOMMENDATIONS: Remove all r/g on margins and throughout - PI and poor form Fd.

Knockdown and then prescribed fire.

Similar to P3 - good polygon to burn - lots of fine fuels and easy to blackline.

Harvest to benchmark - Fd L2 and smaller L1.

POST-TREATMENT STOCKING: OR

PRIORITY: medium

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species				
Becher M	1040	O/S	Douglas-fir	1-25	prickly rose	1-5	R. needlegrass	5-25	silverweed	1-5
	70				common juniper	<1	bluebunch wheatgrass	1-10	timber milkvetch	1-5
TU5	15	U/S	Douglas-fir	1-10			C. needlegrass	1-10	yellow rattle	<1
							crested wheatgrass	1-10	western yarrow	<1
OF		R/G	Lodgepole pine	1-10			porcupine grass	1-5	nodding onion	<1
			Douglas-fir	1-10			timber oatgrass	1-5	old man's whiskers	<1
BCC05034							prairie junegrass	1-2	wild strawberry	<1
138									dune goldenrod	<1

WP: 446

Type 3

NOTES: Landform/Soil: moraine/silt loam. Litt: 75-95, Soil: 1-5, Bryo: 1-5, Range Cond: F-G.

Previos harvest in this TU.

PI - o/s and u/s trees are all dead - only r/g <2m in height are still green.

RECOMMENDATIONS: Slash all PI and poor form Fd r/g. Space Fd u/s.

Clumps within unit should be ~10% forest cover.

Unit is currently OF, but should be converted to OR.

POST-TREATMENT STOCKING: OR

PRIORITY: high

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species
Becher M	1050	O/S	Douglas-fir	1-25 prickly rose	<1 R. needlegrass	5-25 goatsbeard
	180		Trembling aspen	1-10 common juniper	<1 C. needlegrass	1-10 silverweed
TU6	0-2				Kentucky bluegrass	1-10 tarragon
		U/S	Lodgepole pine	1-10	porcupine grass	1-5 old man's whiskers
OF			Douglas-fir	1-5		pasture sage
						Pacific anemone
BCC05035		R/G	Lodgepole pine	1-10		dune goldenrod
	5		Trembling aspen	1-5		timber milkvetch

WP: 447

Type 4

NOTES: Landform/Soil: moraine/silt loam. Litt: 75-95, Soil: 1-5, Bryo: 1-25, Range Cond: F-G.

PI - o/s dead, u/s dead, r/g between 0.5 and 2.0 m still green.

No stumps in currently forested areas.

Fd - only in clumps in middle of unit - no regen.

RECOMMENDATIONS: Slash all PI in all layers and poor form Fd u/s.

Leave forest cover around wetlands.

POST-TREATMENT STOCKING: OR

PRIORITY: high

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species				
Becher M	1050	O/S	Douglas-fir	1-10	prickly rose	<1	Kentucky bluegrass	5-25	goatsbeard	1-5
	140		Trembling aspen	1-5	common juniper	<1	R. needlegrass	1-10	silverweed	1-5
TU7	0-2						C. needlegrass	1-10	pasture sage	<1
		U/S	Douglas-fir	1-10			bluebunch wheatgrass	1-2	dune goldenrod	<1
OR/OF			Trembling aspen	1-5			prairie junegrass	1-2	tarragon	<1
									rosy pussytoes	<1
BCC05035		R/G	Trembling aspen	1-5					nodding onion	<1
5, 6			Lodgepole pine	1-2					old man's whiskers	<1
									graceful cinquefoil	<1

WP: 448

Type 4

NOTES: Landform/Soil: moraine/silt loam. Litt: 50-75, Soil: 1-5, Bryo: 1-10, Range Cond: F-G.

Most trees are on the margin.

Some recent treatment in conjunction with P4 - PI r/g and u/s slashed - W end has been treated - center has not.

Regen < 1m in height remains.

Salvage PI o/s.

RECOMMENDATIONS: Slash all PI in all layers in untreated area.

POST-TREATMENT STOCKING: OR

PRIORITY: high

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species				
Becher M	1020	O/S	Douglas-fir	1-5	prickly rose	<1	Kentucky bluegrass	5-25	silverweed	1-5
	130		Trembling aspen	1-2	common juniper	<1	R. needlegrass	5-25	rosy pussytoes	1-5
TU8	0-5						C. needlegrass	1-10	nodding onion	<1
		U/S	Douglas-fir	1-5			western needlegrass	1-10	tarragon	<1
OR			Trembling aspen	1-5			Sandberg bluegrass	1-2	dune goldenrod	<1
							prairie junegrass	1-2	Hooker's thistle	<1
BCC05035		R/G	Douglas-fir	1-10			bluebunch wheatgrass	<1	brown-eyed susan	<1
	8								old man's whiskers	<1
									alfalfa	<1

WP: 449

Type 4

NOTES: Landform/Soil: moraine/silt loam. Litt: 50-75, Soil: 1-5, Bryo: 1-25, Range Cond: P-F.

Large unit in W end of Becher M near FS fire camp.

Prescribed fire in fall, 2006 - some Fd killed on W side.

Trees on margins or in depressions

Heaviest encroachment is in the E 1/2, especially N of Holding Ground and W edge.

Most r/g is Fd - budworm attack on ~ 50%.

RECOMMENDATIONS: Complete job by slashing remaining Fd r/g and u/s trees.

POST-TREATMENT STOCKING: OR

PRIORITY: high

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species				
Becher M	1050	O/S	Douglas-fir	1-5	prickly rose	<1	Kentucky bluegrass	5-25	goatsbeard	1-2
	90		Trembling aspen	1-2	common juniper	<1	R. needlegrass	5-25	sticky geranium	1-2
TU9	0-2				snowberry		C. needlegrass	1-5	alumroot	<1
		U/S	Lodgepole pine	1-10			prairie junegrass	1-5	stoneseed	<1
OR			Trembling aspen	1-5			porcupine grass	1-2	old man's whiskers	<1
									wild strawberry	<1
BCC05034		R/G	Lodgepole pine	1-10					silverweed	<1
140									death camas	<1
									dune goldenrod	<1
WP: 450									western yarrow	<1
									graceful cinquefoil	<1
Type 4										

NOTES: Landform/Soil: moraine/silt loam. Litt: 75-95, Soil: 1-5, Bryo: 1-5, Range Cond: F-G-E.

NE corner of unit below the Meldrum Creek Road.

PI - o/s dead (grey), most u/s still green attack, r'g green.

Lots of fine fuels - good situation for prescribed fire.

RECOMMENDATIONS: Complete job after fire by slashing remaining PI r/g and u/s trees.

Consider a Non-renewable Forest License to harvest about 30 m beyond the 1962 line to pay for treatment.

POST-TREATMENT STOCKING: OR

PRIORITY: medium

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species				
Becher M	1070	O/S	Douglas-fir	1-10	prickly rose	1-2	Kentucky bluegrass	5-25	goatsbeard	1-2
	80/180/260		Spruce	1-10	bog birch	<1	R. needlegrass	5-25	western yarrow	<1
TU10	0-10				willow species	<1	C. needlegrass	1-5	rosy pussytoes	<1
		U/S	Lodgepole pine	1-5			timber oatgrass	1-5	curly cup gumweed	<1
OR/OF			Trembling aspen	1-5					yellow rattle	<1
							sedge species	1-25	silverweed	<1
BCC05034		R/G	Lodgepole pine	1-10			Inland saltgrass	1-5		
135							Nuttal's alkaligrass	1-2		
							alkali bluegrass	1-2		

WP: 450

Type 4

NOTES: Landform/Soil: moraine/silt loam. Litt: 25-75, Soil: 0-25, Bryo: 0-25, Range Cond: P-F.

Two plant communities - upland and riparian.

Sw, bog birch and willow are clumpy around wetlands.

Lower areas are alkaline meadows with seeps. Upland areas are dominated by R. needlegrass.

PI - o/s and u/s either grey or red attack. PI r/g < 2m in height still green.

Fd in adjoining forest - forest health could be spruce budworm.

RECOMMENDATIONS: Complete job after fire by slashing remaining PI r/g and u/s trees.

Leave wet draws as is - retain Sw and At.

Leave At in clumps where possible.

Clear ridges of Fd - leave a few widely-spaced trees (~20 sph).

POST-TREATMENT STOCKING: OR

PRIORITY: medium

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover	Shrubs Species	Grasses Cover	Grasses Species	Forbs Cover	Forbs Species	Cover
Holding Ground	1040	O/S	Douglas-fir	1-10	prickly rose	1-2	bluebunch wheatgrass	1-10	goatsbeard	1-5
TU1	200		Trembling aspen	1-5	common juniper	<1	prairie junegrass	1-5	western yarrow	1-2
	0-10					<1	Kentucky bluegrass	1-5	nodding onion	<1
OR/OF		U/S	Douglas-fir	1-10			R. needlegrass	1-2	pale comandra	<1
			Trembling aspen	<1			C. needlegrass	1-2	timber milkvetch	<1
BCC05035							timber oatgrass	1-2	showy fleabane	<1
		R/G	Douglas-fir	1-5					pasture sage	<1
	8		Trembling aspen	1-2					false flax	<1
			Lodgepole pine	<1						

WP: 451

Type 3

NOTES: Landform/Soil: moraine/silt loam. Litt: 50-95, Soil: 0-10, Bryo: 0-10, Range Cond: F-G.

Encroachment near wetland, in NW and along E side

Scattered on W side, denser on E side.

Not enough fine fuel for a good burn in 2007.

Harvest Fd on E side.

RECOMMENDATIONS: Slash Fd and PI encroachment, reserve groves of aspen and spruce, leave Fd o/s at OR stocking on N side.

Concentrate efforts on E side.

POST-TREATMENT STOCKING: OR

PRIORITY: medium

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover	Species	Grasses Cover	Species	Forbs Cover	Species	Cover
Military Reserve	1050	O/S	Douglas-fir	1-5	prickly rose	<1	Kentucky bluegrass	1-25	timber milkvetch	1-5
TU1	80		Lodgepole pine	1-2			R. needlegrass	1-25	goatsbeard	1-2
	0-5						C. needlegrass	1-10	silverweed	<1
OR		U/S	Trembling aspen	1-2			prairie junegrass	1-2	old man's whiskers	<1
			Lodgepole pine	1-2					dune goldenrod	<1
			Douglas-fir	<1					yellow rattle	<1
BCC05034									pasture sage	<1
	139	R/G	Lodgepole pine	1-5						
			Trembling aspen	1-2						
WP: 458			Douglas-fir	1-2						

Type 4

NOTES: Landform/Soil: moraine/silt loam. Litt: 75-95, Soil: 1-5, Bryo: 1-5, Range Cond: G-E.

Trees in clumps on margin, few out in center of OR.

PI - r/g and smaller u/s still green - other layers dead.

Highest concentration of trees is on the W side.

RECOMMENDATIONS: All margins need treatment, concentrate efforts here. Slash trees in center of unit also. Retain clumps of At.

Enough litter for fire.

Treat in conjunction with polygons in Becher M to S.

Remove volume on margin.

POST-TREATMENT STOCKING: OR

PRIORITY: medium

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover	Shrubs Species	Grasses Cover	Grasses Species	Forbs Cover	Forbs Species	Cover
Military Reserve	1070	O/S	Douglas-fir	<1	prickly rose	<1	R. needlegrass	1-25	goatsbeard	1-2
TU2	190		Trembling aspen	<1	common juniper	<1	Kentucky bluegrass	1-25	wild strawberry	<1
	0-10						C. needlegrass	1-10	silverweed	<1
OR		U/S	Lodgepole pine	1-5			bluebunch wheatgrass	1-10	old man's whiskers	<1
							porcupine grass	1-5	dune goldenrod	<1
BCC05034		R/G	Lodgepole pine	1-25					northern bedstraw	<1
137, 139			Douglas-fir	1-5					timber milkvetch	<1
WP: 459									sulphur buckwheat	<1
									nodding onion	<1
									rosy pussytoes	<1
									yellow rattle	<1

Type 3

NOTES: Landform/Soil: moraine/silt loam. Litt: 75-95, Soil: 1-5, Bryo: 1-5, Range Cond: G-E.

Light grazing in recent past.

Central portion of Military Reserve.

PI - o/s dead, u/s red, r/g < 2m green.

Treatment problem with dead PI o/s and u/s trees inside At clumps. Fd - no fire except on margins, clumps within have none - no volume.

RECOMMENDATIONS: All margins and necks of grassland need treatment, concentrate efforts here.

Reserve mature aspen clumps.

Forest to N needs treatment also.

POST-TREATMENT STOCKING: OR

PRIORITY: medium

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover	Species	Grasses Cover	Species	Forbs Cover	Species	Cover
Military Reserve	1080	O/S	Douglas-fir	<1	prickly rose	<1	R. needlegrass	5-25	goatsbeard	1-2
TU3	100-150	U/S	Lodgepole pine	1-5	common juniper	<1	Kentucky bluegrass	1-10	silverweed	<1
	0-5		Trembling aspen	1-5			C. needlegrass	1-10	old man's whiskers	<1
OR/OF							bluebunch wheatgrass	1-2	yellow rattle	<1
		R/G	Lodgepole pine	1-25			porcupine grass	1-2	western yarrow	<1
BCC05032							needle-and-thread	<1	timber milkvetch	<1
	165								sulphur buckwheat	<1

WP: 460

Type 4

NOTES: Landform/Soil: moraine/silt loam. Litt: 50-95, Soil: 0-5, Bryo: 0-10, Range Cond: F-G.

Several lakes within polygon.

Necks and indentations in tree line are full of r/g and u/s trees.

PI - all o/s dead, a few u/s still green - mostly red attack, r/g green. Individual u/s trees are very wolfy.

Twig moth in PI r/g.

At is clumpy.

RECOMMENDATIONS: All margins and necks of grassland need treatment, concentrate efforts here.

Encroachment is most dense on S end and SE.

Volume from CF to W - reserve Fd Layer 1.

POST-TREATMENT STOCKING: OR

PRIORITY: high

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species
Military Reserve	1100	O/S	Douglas-fir	1-20 prickly rose	<1 R. needlegrass	5-25 goatsbeard
TU4	180		Trembling aspen	1-20 birch l. spirea	<1 Kentucky bluegrass	1-25 old man's whiskers
	5-10				C. needlegrass	1-5 yellow rattle
OR		U/S	Lodgepole pine	1-5	porcupine grass	1-2 sticky geranium
			Trembling aspen	1-2		graceful cinquefoil
			Douglas-fir	<1		smooth agoseris
BCC05032						dune goldenrod
166		R/G	Lodgepole pine	1-25		balsamroot
			Douglas-fir	<1		western yarrow
WP: 456						timber milkvetch
Type 4						stoneseed
						showy fleabane
						American vetch

NOTES: Landform/Soil: moraine/silt loam. Litt: 50-95, Soil: 0-10, Bryo: 0-5, Range Cond: F.

Approximately 25% of PI u/s dead. PI o/s about 1-2% still at green attack stage.

Classic encroachment followed by ingrowth.

At clumpy where found.

RECOMMENDATIONS: Slash all PI r/g and u/s trees.

POST-TREATMENT STOCKING: OR

PRIORITY: high

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover	Species	Grasses Cover	Species	Forbs Cover	Species	Cover
Becher W	1100	O/S	Douglas-fir	1-20	prickly rose	<1	R. needlegrass	5-25	sticky geranium	1-5
	180-290		Trembling aspen	1-5			Kentucky bluegrass	5-25	old man's whiskers	1-2
TU1	0-10						C. needlegrass	1-5	goatsbeard	<1
		U/S	Lodgepole pine	1-5			porcupine grass	1-5	western yarrow	<1
OR			Trembling aspen	1-5					rosy pussytoes	<1
									dune goldenrod	<1
BCC05034		R/G	Lodgepole pine	1-25						
133			Trembling aspen	1-5						

WP: 454

Type 4

NOTES: Landform/Soil: moraine/silt loam. Litt: 50-95, Soil: 0-10, Bryo: 0-5, Range Cond: F.

E side of IR.

PI - o/s dead, u/s red, r/g green.

Margins and necks on irregular forest border are full of encroaching trees - mainly PI.

At is clumpy with cover up to 25%.

Lots of historical grazing.

RECOMMENDATIONS: All margins and necks of grassland need treatment - slash PI r/g and u/s trees.

Encroachment is most dense on E side.

POST-TREATMENT STOCKING: OR

PRIORITY: medium

Appendix 3. (cont'd).

Pasture Site Airphoto	Elev Aspect Slope	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species				
Becher W	1100	O/S	Douglas-fir	1-20	prickly rose	<1	R. needlegrass	5-25	sticky geranium	1-5
	180-290		Trembling aspen	1-5			Kentucky bluegrass	5-25	old man's whiskers	1-2
TU2	0-10						C. needlegrass	1-5	goatsbeard	<1
		U/S	Lodgepole pine	1-5			porcupine grass	1-5	western yarrow	<1
OR			Trembling aspen	1-5					rosy pussytoes	<1
									dune goldenrod	<1
BCC05034		R/G	Lodgepole pine	1-25						
133			Trembling aspen	1-5						
BCC05032										
166										
WP: 454										

Type 4

NOTES: Landform/Soil: moraine/silt loam. Litt: 50-95, Soil: 0-10, Bryo: 0-5, Range Cond: F.

PI - o/s dead, u/s red, r/g green.

Margins and necks on irregular forest border are full of encroaching trees - mainly PI.

At is clumpy with cover up to 25%.

Lots of historical grazing.

RECOMMENDATIONS: All margins and necks of grassland need treatment - slash PI r/g and u/s trees.

Encroachment is most dense on E side.

POST-TREATMENT STOCKING: OR

PRIORITY: high

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species				
Becher W	1100	O/S	Douglas-fir	1-5	prickly rose	<1	R. needlegrass	5-25	goatsbeard	1-5
	180		Trembling aspen	1-5	birch l. spirea	<1	Kentucky bluegrass	1-25	old man's whiskers	1-2
TU3	5-20						C. needlegrass	1-5	yellow rattle	1-2
		U/S	Lodgepole pine	1-5			porcupine grass	1-2	sticky geranium	<1
OR			Trembling aspen	1-2					graceful cinquefoil	<1
			Douglas-fir	<1					smooth agoseris	<1
BCC05034									dune goldenrod	<1
133		R/G	Douglas-fir	1-25					balsamroot	<1
									western yarrow	<1
Type 4									timber milkvetch	<1
									stoneseed	<1
									showy fleabane	<1
									American vetch	<1

NOTES: Landform/Soil: moraine/silt loam. Litt: 50-75, Soil: 0-10, Bryo: 0-5, Range Cond: F.

Site to N of Becher Dam on N side of HWY 20.

Encroachment from forest border to N.

RECOMMENDATIONS: Slash Fd r/g and u/s trees.

Retain OR stocking.

POST-TREATMENT STOCKING: OR

PRIORITY: high

Appendix 3. (cont'd).

Pasture Site Airphoto	Elev Aspect Slope	Forest Cover Class	Trees Species	Cover	Shrubs Species	Cover	Grasses Species	Cover	Forbs Species	Cover
Becher W	1100	O/S	Douglas-fir	1-20	prickly rose	<1	R. needlegrass	5-25	sticky geranium	1-5
	180-290		Trembling aspen	1-5			Kentucky bluegrass	5-25	old man's whiskers	1-2
TU4	0-10						C. needlegrass	1-5	goatsbeard	<1
		U/S	Lodgepole pine	1-5			porcupine grass	1-5	western yarrow	<1
OR/OF			Trembling aspen	1-2					rosy pussytoes	<1
			Douglas-fir	1-5					dune goldenrod	<1
BCC05034										
	133	R/G	Douglas-fir	1-10						
			Lodgepole pine	1-10						
Type 4			Trembling aspen	<1						

NOTES: Landform/Soil: moraine/silt loam. Litt: 50-95, Soil: 0-10, Bryo: 0-5, Range Cond: F.

PI - o/s dead, u/s red, r/g green.

W side of IR.

Margins and necks on irregular forest border are full of encroaching trees - mainly PI.

At is clumpy with cover up to 25%.

Encroachment from forest edge on N side.

RECOMMENDATIONS: All margins and necks of grassland need treatment - slash PI r/g and u/s trees.

POST-TREATMENT STOCKING: OR

PRIORITY: medium

Appendix 3. (cont'd).

Pasture Site Airphoto	Elev Aspect Slope	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species
Becher W	1210	O/S	Douglas-fir	1-15 prickly rose	1-2 R. needlegrass	5-25 yellow rattle
	150/330/180		Trembling aspen	1-15 bearberry	1-2 Kentucky bluegrass	1-25 stoneseed
TU5	0-20				prairie junegrass	1-10 old man's whiskers
		U/S	Douglas-fir	1-10	timber oatgrass	1-5 northern bedstraw
OR/OF			Trembling aspen	1-10	bluebunch wheatgrass	1-5 alumroot
			Lodgepole pine	1-5	C. needlegrass	1-2 goatsbeard
BCC05034					porcupine grass	1-2 sticky geranium
	131	R/G	Lodgepole pine	1-25		nodding onion
			Douglas-fir	1-10		rosy pussytoes
WP: 457			Trembling aspen	1-5		showy fleabane

NOTES: Landform/Soil: moraine/silt loam. Litt: 50-95, Soil: 0-10, Bryo: 0-5, Range Cond: F.

Mosaic of OR/OF/CF/R in W end of BPW.

PI - o/s dead, u/s red, r/g green. Dead trees extend well beyond the 1962 margin.

Margins and necks on irregular forest border are full of encroaching trees - mainly PI.

RECOMMENDATIONS: All margins and necks of grassland need treatment - slash PI r/g and u/s trees.

Encroachment is most dense on E side.

POST-TREATMENT STOCKING: OR

PRIORITY: medium

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species				
Grazing Lease #1	1070	O/S	Douglas-fir	1-10	prickly rose	<1	Kentucky bluegrass	1-25	old man's whiskers	1-5
TU1	310		Lodgepole pine	<1			R. needlegrass	1-25	sulphur buckwheat	1-2
	0-10						C. needlegrass	1-10	silverweed	<1
OR		U/S	Douglas-fir	1-5			prairie junegrass	1-2	timber milkvetch	<1
			Trembling aspen	1-5					showy fleabane	<1
			Lodgepole pine	1-5						
BCC05034										
	135	R/G	Douglas-fir	1-5						
			Lodgepole pine	1-2						
WP: 452			Trembling aspen	1-2						

Type 4

NOTES: Landform/Soil: moraine/silt loam. Litt: 75-95, Soil: 1-5, Bryo: 1-5, Range Cond: F.

Pruning on Fd u/s and o/s trees in SE corner N of PL.

Grazed recently.

RECOMMENDATIONS: Some slashing on E side, plus scattered trees.

POST-TREATMENT STOCKING: OR

PRIORITY: medium

Appendix 3. (cont'd).

Pasture Site Airphoto	Elev Aspect Slope	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Cover Species				
Grazing Lease #2	1100	O/S	Douglas-fir	1-20	prickly rose	<1	R. needlegrass	5-25	sticky geranium	1-5
	180-290		Trembling aspen	1-5			Kentucky bluegrass	5-25	old man's whiskers	1-2
	0-10						C. needlegrass	1-5	goatsbeard	<1
TU1		U/S	Lodgepole pine	1-5			porcupine grass	1-5	western yarrow	<1
			Douglas-fir	1-5					rosy pussytoes	<1
OR			Trembling aspen						dune goldenrod	<1
BCC05034		R/G	Lodgepole pine	1-5						
	133		Douglas-fir	1-5						
			Trembling aspen	<1						

NOTES: Landform/Soil: moraine/silt loam. Litt: 50-95, Soil: 0-10, Bryo: 0-5, Range Cond: F.

PI - o/s dead, u/s red, r/g green.

W side of Riske Creek.

Encroachment from forest border to N - Fd and PI.

RECOMMENDATIONS: Slash r/g and u/s trees.

POST-TREATMENT STOCKING: OR

PRIORITY: low

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover	Species	Grasses Cover	Species	Forbs Cover	Species	Cover
Grazing Lease #3	1070	O/S	Douglas-fir	1-10	prickly rose	<1	Kentucky bluegrass	1-25	old man's whiskers	1-5
TU1	310		Lodgepole pine	<1			R. needlegrass	1-25	sulphur buckwheat	1-2
	0-10						C. needlegrass	1-10	silverweed	<1
OR/OF		U/S	Douglas-fir	1-5			prairie junegrass	1-2	timber milkvetch	<1
			Trembling aspen	1-5					showy fleabane	<1
			Lodgepole pine	1-5						
BCC05034										
	135	R/G	Douglas-fir	1-5						
			Lodgepole pine	1-2						
Type 4			Trembling aspen	1-2						

NOTES: Landform/Soil: moraine/silt loam. Litt: 75-95, Soil: 1-5, Bryo: 1-5, Range Cond: F. Encroachment from forest edge.

RECOMMENDATIONS: Slash u/s and r/g Fd and PI.

POST-TREATMENT STOCKING: OR

PRIORITY: medium

Appendix 3. (cont'd).

Pasture Site	Elev Aspect	Forest Cover Class	Trees Species	Shrubs Cover Species	Grasses Cover Species	Forbs Species	Cover	Cover
TLC Bull	500-700							
	90							
P1	0-30							
OR								
BCC05032								
157								

NOTES: Landform: lacustrine/silt

Steep river breaks above the Fraser River.

No inspection.

Encroachment is less problematic on lower elevation plant communities (bunchgrass sites) on river breaks.

RECOMMENDATION: As is.

PRIORITY: N/A.

Appendix 4. Polygons areas at Becher Prairie Range Unit in August, 2007.

Pasture	TU ID	PLY ID	Treatment	Encr	Area (ha)	TU Total	Class Sub-total	Class Total	Total
Beacher East		420	CF		2.6				
Beacher East		453	CF		23.1				
Beacher East		472	CF		9.5				
Beacher East		579	CF		7.1				
Beacher East		599	CF		46.4				
Beacher East		665	CF		675.9				
Beacher East		671	CF		138.3				
Beacher East		682	CF		747.0				
Beacher East		576	CF		224.0				
Beacher East		707	CF		1.0				
Beacher East		707	CF		5.4				
							1880.3		
								1880.3	
Beacher East	3	505	OR	Yes	9.3				
Beacher East	3	568	OR	Yes	18.5				
Beacher East	3	572	OR	Yes	8.3				
Beacher East	3	592	OR	Yes	12.7				
						48.8			
Beacher East	5	451	OR	Yes	4.0				
Beacher East	5	479	OR	Yes	4.7				
Beacher East	5	485	OR	Yes	6.0				
						14.7			
							63.6		
Beacher East	2	600	OR		3.0				
Beacher East	2	601	OR		0.2				
Beacher East	2	618	OR		7.3				
						10.5			
Beacher East	3	528	OR		9.8				
Beacher East	3	542	OR		8.6				
Beacher East	3	570	OR		33.1				
Beacher East	3	557	OR		0.6				
						52.1			
Beacher East	5	509	OR		37.5				
Beacher East	5	591	OR		4.1				
						41.6			
							104.2		
								167.8	
Beacher East	1	593	OR/OF	Yes	3.8				
Beacher East	1	639	OR/OF	Yes	16.9				
Beacher East	1	644	OR/OF	Yes	1.2				
Beacher East	1	657	OR/OF	Yes	7.8				
Beacher East	1	664	OR/OF	Yes	2.7				
Beacher East	1	724	OR/OF	Yes	5.6				
						38.1			

Appendix 4. (cont'd).

Pasture	TU ID	PLY ID	Treatment	Encr	Area (ha)	TU Total	Class Sub-total	Class Total	Total
Beacher East	4	380	OR/OF	Yes	23.6				
Beacher East	4	452	OR/OF	Yes	80.4				
Beacher East	4	490	OR/OF	Yes	2.5				
Beacher East	4	502	OR/OF	Yes	41.0				
Beacher East	4	552	OR/OF	Yes	61.6				
Beacher East	4	574	OR/OF	Yes	37.8				
						246.9			
Beacher East	6	396	OR/OF	Yes	9.9				
Beacher East	6	445	OR/OF	Yes	19.7				
						29.6			
							314.6		
Beacher East	1	643	OR/OF		2.4				
Beacher East	1	663	OR/OF		7.0				
Beacher East	1	723	OR/OF		0.4				
Beacher East	1	657	OR/OF		5.5				
							15.3		
								329.9	
Beacher East		158	Water		0.0				
Beacher East		165	Water		16.5				
Beacher East		228	Water		1.7				
Beacher East		242	Water		2.3				
Beacher East		259	Water		0.4				
Beacher East		267	Water		2.3				
Beacher East		284	Water		0.9				
Beacher East		289	Water		0.1				
							24.2		
								24.2	
Becher East		377	PL		147.1				
Becher East		378	PL		50.3				
Becher East		547	PL		479.6				
							677.0		
Becher East		230	Water		0.9				
Becher East		232	Water		1.2				
							2.1		
Becher East		229	Wetland		1.6				
Becher East		231	Wetland		0.1				
Becher East		233	Wetland		8.4				
							10.2		
								689.4	
Beacher East		167	Wetland		3.0				
							3.0		
Pasture Total								3094.7	3094.7

Appendix 4. (cont'd).

Pasture	TU ID	PLY ID	Treatment	Encr	Area (ha)	TU Total	Class Sub-total	Class Total	Total
Beacher Middle		336	CF		5.9				
Beacher Middle		337	CF		1.7				
Beacher Middle		339	CF		2.0				
Beacher Middle		340	CF		6.7				
Beacher Middle		341	CF		19.3				
Beacher Middle		342	CF		1.3				
Beacher Middle		344	CF		5.3				
Beacher Middle		345	CF		2.7				
Beacher Middle		346	CF		1.7				
Beacher Middle		347	CF		3.0				
Beacher Middle		348	CF		1.9				
Beacher Middle		350	CF		4.5				
Beacher Middle		351	CF		1.0				
Beacher Middle		352	CF		7.2				
Beacher Middle		354	CF		4.3				
Beacher Middle		364	CF		7.1				
Beacher Middle		370	CF		1.1				
Beacher Middle		371	CF		0.4				
Beacher Middle		373	CF		2.8				
Beacher Middle		376	CF		1.6				
Beacher Middle		379	CF		12.7				
Beacher Middle		383	CF		5.7				
Beacher Middle		386	CF		6.6				
Beacher Middle		387	CF		54.7				
Beacher Middle		390	CF		2.2				
Beacher Middle		391	CF		0.9				
Beacher Middle		392	CF		9.5				
Beacher Middle		397	CF		1.4				
Beacher Middle		399	CF		3.3				
Beacher Middle		401	CF		16.7				
Beacher Middle		402	CF		5.9				
Beacher Middle		406	CF		1.8				
Beacher Middle		408	CF		3.9				
Beacher Middle		416	CF		6.9				
Beacher Middle		422	CF		3.3				
Beacher Middle		426	CF		647.9				
Beacher Middle		432	CF		0.8				
Beacher Middle		433	CF		0.0				
Beacher Middle		435	CF		1.2				
Beacher Middle		437	CF		329.6				
Beacher Middle		438	CF		1.3				
Beacher Middle		439	CF		1.6				
Beacher Middle		441	CF		16.3				
Beacher Middle		447	CF		4.5				
Beacher Middle		576	CF		386.4				
Beacher Middle		576	CF		46.9				
							1653.5		

Appendix 4. (cont'd).

Pasture	TU ID	PLY ID	Treatment	Encr	Area (ha)	TU Total	Class Sub-total	Class Total	Total
									1653.5
Beacher Middle	5	382	OF	Yes	66.3				
Beacher Middle	6	360	OF	Yes	86.8				
							153.2		
								153.2	
Beacher Middle	1	486	OR	Yes	9.6				
Beacher Middle	1	492	OR	Yes	10.0				
Beacher Middle	1	571	OR	Yes	17.4				
						37.0			
Beacher Middle	3	353	OR	Yes	6.1				
Beacher Middle	3	356	OR	Yes	8.6				
Beacher Middle	3	415	OR	Yes	52.8				
Beacher Middle	3	478	OR	Yes	9.0				
Beacher Middle	3	722	OR	Yes	49.7				
						126.2			
Beacher Middle	4	446	OR	Yes	13.4				
Beacher Middle	4	449	OR	Yes	93.1				
Beacher Middle	4	719	OR	Yes	47.9				
						154.4			
Beacher Middle	8	357	OR	Yes	1.4				
Beacher Middle	8	440	OR	Yes	21.4				
Beacher Middle	8	442	OR	Yes	4.6				
Beacher Middle	8	443	OR	Yes	348.3				
Beacher Middle	8	443	OR	Yes	121.9				
						497.7			
Beacher Middle	9	529	OR	Yes	16.1				
							831.3		
Beacher Middle	1	520	OR		23.3				
Beacher Middle	3	477	OR		559.5				
Beacher Middle	4	448	OR		240.8				
Beacher Middle	8	374	OR		518.2				
Beacher Middle	8	444	OR		4.4				
Beacher Middle	8	443	OR		76.1				
Beacher Middle	8	443	OR		97.4				
						696.2			
Beacher Middle	9	508	OR		14.7				
							1534.4		
								2365.7	
Beacher Middle	2	419	OR/OF	Yes	146.0				
Beacher Middle	7	362	OR/OF	Yes	205.0				

Appendix 4. (cont'd).

Pasture	TU ID	PLY ID	Treatment	Encr	Area (ha)	TU Total	Class Sub-total	Class Total	Total
Beacher Middle	10	411	OR/OF	Yes	3.7				
Beacher Middle	10	413	OR/OF	Yes	8.6				
Beacher Middle	10	434	OR/OF	Yes	21.4				
						33.7			
							384.7		
Beacher Middle	7	343	OR/OF		16.5				
Beacher Middle	10	431	OR/OF		77.6				
							94.0		
								478.7	
Beacher Middle		123	Water		7.4				
Beacher Middle		126	Water		0.7				
Beacher Middle		128	Water		10.6				
Beacher Middle		132	Water		3.2				
Beacher Middle		135	Water		0.8				
Beacher Middle		162	Water		0.2				
Beacher Middle		163	Water		0.4				
Beacher Middle		166	Water		0.3				
Beacher Middle		168	Water		26.2				
Beacher Middle		169	Water		0.4				
Beacher Middle		170	Water		0.1				
Beacher Middle		171	Water		0.2				
Beacher Middle		277	Water		10.6				
Beacher Middle		278	Water		0.2				
Beacher Middle		279	Water		2.2				
Beacher Middle		280	Water		0.0				
Beacher Middle		281	Water		1.9				
Beacher Middle		282	Water		0.1				
Beacher Middle		283	Water		1.5				
Beacher Middle		285	Water		0.8				
Beacher Middle		286	Water		2.7				
Beacher Middle		287	Water		0.3				
Beacher Middle		288	Water		0.2				
Beacher Middle		290	Water		0.6				
Beacher Middle		292	Water		0.2				
Beacher Middle		293	Water		0.1				
Beacher Middle		294	Water		0.3				
Beacher Middle		295	Water		0.1				
Beacher Middle		296	Water		0.2				
Beacher Middle		297	Water		0.2				
Beacher Middle		298	Water		0.2				
Beacher Middle		299	Water		0.1				
Beacher Middle		300	Water		0.6				
Beacher Middle		301	Water		0.2				
Beacher Middle		302	Water		0.2				
Beacher Middle		303	Water		0.1				
Beacher Middle		304	Water		0.1				

Appendix 4. (cont'd).

Pasture	TU ID	PLY ID	Treatment	Encr	Area (ha)	TU Total	Class Sub-total	Class Total	Total
Beacher Middle		305	Water		0.1				
Beacher Middle		306	Water		0.6				
Beacher Middle		307	Water		0.1				
Beacher Middle		308	Water		0.0				
Beacher Middle		309	Water		0.0				
Beacher Middle		310	Water		0.0				
Beacher Middle		311	Water		0.0				
Beacher Middle		312	Water		0.3				
Beacher Middle		313	Water		0.0				
Beacher Middle		314	Water		0.3				
Beacher Middle		315	Water		0.6				
Beacher Middle		319	Water		0.3				
Beacher Middle		323	Water		0.1				
							76.7		
								76.7	
Beacher Middle		164	Wetland		1.2				
Beacher Middle		291	Wetland		3.2				
							4.5		
								4.5	
Becher Middle		335	PL		16.0				
Becher Middle		338	PL		7.4				
Becher Middle		349	PL		64.4				
							87.7		
Becher Middle		134	Water		0.8				
Becher Middle		136	Water		0.9				
Becher Middle		321	Water		0.2				
							1.9		
								89.6	
Pasture Total									4821.9
Beacher West		409	CF		127.8				
Beacher West		410	CF		1.9				
Beacher West		414	CF		27.8				
Beacher West		417	CF		6.0				
Beacher West		421	CF		1.0				
Beacher West		423	CF		16.2				
Beacher West		469	CF		1.6				
Beacher West		470	CF		8.8				
Beacher West		476	CF		1.7				
Beacher West		489	CF		9.2				
Beacher West		513	CF		0.2				
Beacher West		533	CF		6.9				
Beacher West		537	CF		19.8				

Appendix 4. (cont'd).

Pasture	TU ID	PLY ID	Treatment	Encr	Area (ha)	TU Total	Class Sub-total	Class Total	Total
Beacher West		586	CF		343.5				
Beacher West		597	CF		119.1				
Beacher West		630	CF		10.5				
Beacher West		647	CF		33.0				
Beacher West		650	CF		1.2				
Beacher West		659	CF		49.2				
							785.4		
								785.4	
Beacher West	1	718	OR	Yes	37.6				
Beacher West	1	430	OR	Yes	6.8				
						44.4			
Beacher West	2	530	OR	Yes	0.7				
Beacher West	2	539	OR	Yes	3.7				
Beacher West	2	555	OR	Yes	16.4				
Beacher West	2	556	OR	Yes	2.0				
Beacher West	2	558	OR	Yes	3.2				
Beacher West	2	575	OR	Yes	0.5				
Beacher West	2	590	OR	Yes	5.2				
Beacher West	2	615	OR	Yes	7.6				
Beacher West	2	649	OR	Yes	42.3				
Beacher West	2	662	OR	Yes	29.0				
						110.5			
Beacher West	3	372	OR	Yes	11.0				
Beacher West	3	424	OR	Yes	70.3				
						81.3			
							236.2		
Beacher West	1	430	OR		50.4				
Beacher West	2	578	OR		31.2				
Beacher West	2	640	OR		0.9				
Beacher West	2	653	OR		17.1				
						49.2			
Beacher West	3	359	OR		8.2				
Beacher West	3	361	OR		3.4				
Beacher West	3	407	OR		17.9				
Beacher West	3	412	OR		2.1				
						31.8			
							131.4		
								367.6	
Beacher West	4	457	OR/OF	Yes	6.7				
Beacher West	4	516	OR/OF	Yes	18.9				
Beacher West	4	532	OR/OF	Yes	1.7				
Beacher West	4	540	OR/OF	Yes	1.0				
Beacher West	4	561	OR/OF	Yes	2.5				
Beacher West	4	583	OR/OF	Yes	8.2				
						39.0			

Appendix 4. (cont'd).

Pasture	TU ID	PLY ID	Treatment	Encr	Area (ha)	TU Total	Class Sub-total	Class Total	Total
Beacher West	5	450	OR/OF	Yes	2.1				
Beacher West	5	460	OR/OF	Yes	0.9				
Beacher West	5	463	OR/OF	Yes	3.8				
Beacher West	5	465	OR/OF	Yes	5.0				
Beacher West	5	491	OR/OF	Yes	28.9				
Beacher West	5	495	OR/OF	Yes	16.8				
Beacher West	5	499	OR/OF	Yes	2.5				
Beacher West	5	507	OR/OF	Yes	10.5				
Beacher West	5	522	OR/OF	Yes	37.2				
Beacher West	5	559	OR/OF	Yes	7.9				
Beacher West	5	580	OR/OF	Yes	5.2				
Beacher West	5	625	OR/OF	Yes	30.3				
						151.1			
							190.2		
Beacher West	4	418	OR/OF		2.7				
Beacher West	4	484	OR/OF		15.9				
Beacher West	4	504	OR/OF		35.2				
Beacher West	4	531	OR/OF		3.2				
						57.0			
Beacher West	5	519	OR/OF		16.2				
Beacher West	5	538	OR/OF		81.6				
Beacher West	5	551	OR/OF		4.0				
Beacher West	5	603	OR/OF		5.9				
						107.7			
							164.7		
								354.8	
Beacher West		19	Water		0.6				
Beacher West		20	Water		1.0				
Beacher West		26	Water		4.0				
Beacher West		27	Water		0.2				
Beacher West		29	Water		1.2				
Beacher West		32	Water		0.1				
Beacher West		118	Water		0.9				
Beacher West		30	Water		0.7				
							8.7		
								8.7	
Beacher West		28	Wetland		0.6				
Beacher West		31	Wetland		4.0				
Beacher West		23	Wetland		2.7				
Beacher West		31	Wetland		4.7				
							12.0		
								12.0	

Appendix 4. (cont'd).

Pasture	TU ID	PLY ID	Treatment	Encr	Area (ha)	TU Total	Class Sub-total	Class Total	Total
Becher West		363	PL		5.2				
Becher West		375	PL		185.3				
Becher West		395	PL		4.4				
Becher West		428	PL		347.9				
Becher West		464	PL		117.1				
Becher West		521	PL		226.5				
Becher West		594	PL		16.7				
Becher West		661	PL		360.5				
							1263.6		
Becher West		30	Water		2.7				
Becher West		125	Water		0.3				
								3.0	
Becher West		23	Wetland		3.4				
Becher West		31	Wetland		0.1				
Becher West		31	Wetland		2.0				
								5.4	
								1272.0	
Pasture Total									2800.5
Grazing Lease #1		384	CF		0.6				
Grazing Lease #1		385	CF		0.3				
Grazing Lease #1		393	CF		0.5				
Grazing Lease #1		398	CF		3.7				
Grazing Lease #1		405	CF		7.7				
							12.9		
								12.9	
Grazing Lease #1	1	400	OR	Yes	15.8				
Grazing Lease #1	1	404	OR	Yes	0.3				
								16.1	
Grazing Lease #1	1	394	OR		0.3				
Grazing Lease #1	1	403	OR		34.7				
								35.0	
								51.2	
Grazing Lease #1		127	Water		0.6				
								0.6	
								0.6	
									64.6
Grazing Lease #2	1	429	OR	Yes	6.9				
								6.9	
Grazing Lease #2	1	425	OR		21.2				
								6.9	
								21.2	

Appendix 4. (cont'd).

Pasture	TU ID	PLY ID	Treatment	Encr	Area (ha)	TU Total	Class Sub-total	Class Total	Total
								21.2	
			Pasture Total						28.1
Grazing Lease #3		535	CF		5.4		5.4		
Grazing Lease #3	1	534	OR/OF	Yes	7.6		7.6	5.4	
Grazing Lease #3	1	498	OR/OF		2.9				
Grazing Lease #3	1	512	OR/OF		12.0		14.9		
Grazing Lease #3		31	Wetland		3.6			22.6	
							3.6		
								3.6	31.6
Holding Ground		355	CF		9.3				
Holding Ground		358	CF		0.8				
Holding Ground		367	CF		1.0				
Holding Ground		369	CF		0.1		11.2		
Holding Ground	1	365	OR/OF	Yes	8.0			11.2	
Holding Ground	1	368	OR/OF	Yes	56.0		64.0		
Holding Ground	1	366	OR/OF		66.4		66.4		
Holding Ground		133	Water		0.2			130.3	
Holding Ground		134	Water		0.6				
							0.8		
								0.8	142.4
Leech Lake		666	CF		16.8				
Leech Lake		685	CF		35.5				
Leech Lake		690	CF		1.4				
Leech Lake		703	CF		2.2				
Leech Lake		705	CF		2.4				
Leech Lake		715	CF		19.6		77.9		
								77.9	

Appendix 4. (cont'd).

Pasture	TU ID	PLY ID	Treatment	Encr	Area (ha)	TU Total	Class Sub-total	Class Total	Total
Leech Lake	1	711	OR	Yes	3.4				
Leech Lake	1	714	OR	Yes	16.1				
						19.5			
Leech Lake	2	675	OR	Yes	4.9				
Leech Lake	2	688	OR	Yes	3.4				
						8.4			
							27.8		
Leech Lake	1	713	OR		53.6				
Leech Lake	2	692	OR		3.8				
Leech Lake	2	693	OR		55.1				
						58.9			
							112.6		
								140.4	
Leech Lake		200	Water		2.7				
Leech Lake		208	Water		0.6				
							3.4		
								3.4	
Pasture Total									221.6
Military Reserve		436	CF		0.0				
Military Reserve		456	CF		0.7				
Military Reserve		459	CF		0.0				
Military Reserve		461	CF		5.8				
Military Reserve		462	CF		1.1				
Military Reserve		466	CF		0.7				
Military Reserve		467	CF		14.0				
Military Reserve		471	CF		2.8				
Military Reserve		480	CF		0.4				
Military Reserve		488	CF		25.1				
Military Reserve		493	CF		1.4				
Military Reserve		494	CF		1.1				
Military Reserve		496	CF		5.1				
Military Reserve		500	CF		4.9				
Military Reserve		501	CF		2.1				
Military Reserve		503	CF		10.7				
Military Reserve		514	CF		4.2				
Military Reserve		517	CF		2.1				
Military Reserve		518	CF		0.5				
Military Reserve		523	CF		0.8				
Military Reserve		524	CF		1.7				
Military Reserve		525	CF		0.6				
Military Reserve		526	CF		2.0				
Military Reserve		527	CF		1.4				
Military Reserve		543	CF		0.9				
Military Reserve		545	CF		0.8				

Appendix 4. (cont'd).

Pasture	TU ID	PLY ID	Treatment	Encr	Area (ha)	TU Total	Class Sub-total	Class Total	Total
Millitary Reserve		546	CF		2.7				
Millitary Reserve		548	CF		0.3				
Millitary Reserve		549	CF		0.2				
Millitary Reserve		553	CF		1.5				
Millitary Reserve		560	CF		1.8				
Millitary Reserve		567	CF		15.3				
Millitary Reserve		573	CF		20.6				
Millitary Reserve		577	CF		0.7				
Millitary Reserve		598	CF		2.4				
Millitary Reserve		604	CF		2.8				
Millitary Reserve		610	CF		0.4				
Millitary Reserve		611	CF		0.7				
Millitary Reserve		613	CF		3.4				
Millitary Reserve		617	CF		4.1				
Millitary Reserve		627	CF		0.9				
Millitary Reserve		632	CF		11.7				
Millitary Reserve		637	CF		2.8				
Millitary Reserve		638	CF		11.0				
Millitary Reserve		648	CF		1.5				
Millitary Reserve		651	CF		1.5				
Millitary Reserve		656	CF		4.5				
Millitary Reserve		658	CF		49.7				
Millitary Reserve		667	CF		3.3				
Millitary Reserve		669	CF		8.0				
Millitary Reserve		673	CF		2.0				
Millitary Reserve		676	CF		1357.4				
Millitary Reserve		678	CF		4.5				
Millitary Reserve		679	CF		2.1				
Millitary Reserve		687	CF		4.2				
Millitary Reserve		704	CF		17.3				
Millitary Reserve		717	CF		1740.5				
Millitary Reserve		720	CF		1.8				
							3372.6		
								3372.6	
Millitary Reserve	1	515	OR	Yes	7.3				
Millitary Reserve	1	588	OR	Yes	10.3				
Millitary Reserve	1	606	OR	Yes	165.7				
						183.2			
Millitary Reserve	2	458	OR	Yes	1.9				
Millitary Reserve	2	497	OR	Yes	62.0				
Millitary Reserve	2	541	OR	Yes	16.5				
Millitary Reserve	2	562	OR	Yes	15.9				
Millitary Reserve	2	654	OR	Yes	90.4				
Millitary Reserve	2	683	OR	Yes	33.2				
Millitary Reserve	2	672	OR	Yes	53.4				
						273.2			

Appendix 4. (cont'd).

<u>Pasture</u>	<u>TU ID</u>	<u>PLY ID</u>	<u>Treatment</u>	<u>Encr</u>	<u>Area (ha)</u>	<u>TU Total</u>	<u>Class Sub-total</u>	<u>Class Total</u>	<u>Total</u>
							456.4		
Military Reserve	1	474	OR		22.2				
Military Reserve	1	475	OR		5.4				
Military Reserve	1	550	OR		79.7				
Military Reserve	1	581	OR		123.2				
						230.6			
Military Reserve	2	642	OR		4.4				
Military Reserve	2	672	OR		489.3				
Military Reserve	2	672	OR		8.7				
Military Reserve	2	672	OR		44.5				
						547.0			
							777.6		
								1233.9	
Military Reserve	3	607	OR/OF	Yes	0.0				
Military Reserve	3	626	OR/OF	Yes	0.8				
Military Reserve	3	629	OR/OF	Yes	3.8				
Military Reserve	3	641	OR/OF	Yes	3.7				
Military Reserve	3	646	OR/OF	Yes	11.8				
Military Reserve	3	652	OR/OF	Yes	9.7				
Military Reserve	3	655	OR/OF	Yes	50.8				
Military Reserve	3	660	OR/OF	Yes	0.3				
Military Reserve	3	670	OR/OF	Yes	34.6				
Military Reserve	3	677	OR/OF	Yes	4.0				
Military Reserve	3	686	OR/OF	Yes	3.4				
Military Reserve	3	695	OR/OF	Yes	0.1				
Military Reserve	3	701	OR/OF	Yes	47.3				
Military Reserve	3	706	OR/OF	Yes	111.9				
Military Reserve	3	708	OR/OF	Yes	34.2				
Military Reserve	3	709	OR/OF	Yes	3.9				
Military Reserve	3	710	OR/OF	Yes	5.2				
Military Reserve	3	712	OR/OF	Yes	0.7				
Military Reserve	3	716	OR/OF	Yes	13.6				
Military Reserve	3	721	OR/OF	Yes	10.1				
Military Reserve	3	725	OR/OF	Yes	2.7				
Military Reserve	3	607	OR/OF	Yes	193.5				
						546.2			
Military Reserve	4	473	OR/OF	Yes	10.3				
Military Reserve	4	585	OR/OF	Yes	80.0				
						90.4			
							636.6		
Military Reserve	3	483	OR/OF		24.3				
Military Reserve	3	587	OR/OF		13.1				
Military Reserve	3	595	OR/OF		3.3				
Military Reserve	3	694	OR/OF		30.8				

Appendix 4. (cont'd).

Pasture	TU ID	PLY ID	Treatment	Enchr	Area (ha)	TU Total	Class Sub-total	Class Total	Total
Millitary Reserve	3		702	OR/OF	216.1				
						287.6			
Millitary Reserve	4		468	OR/OF	16.6				
							304.2		
								940.8	
Millitary Reserve			6	Water	0.4				
Millitary Reserve			7	Water	0.8				
Millitary Reserve			8	Water	0.1				
Millitary Reserve			9	Water	1.0				
Millitary Reserve			11	Water	24.8				
Millitary Reserve			12	Water	0.2				
Millitary Reserve			13	Water	0.2				
Millitary Reserve			16	Water	0.6				
Millitary Reserve			17	Water	1.4				
Millitary Reserve			18	Water	0.0				
Millitary Reserve			21	Water	2.8				
Millitary Reserve			22	Water	47.8				
Millitary Reserve			24	Water	0.1				
Millitary Reserve			25	Water	0.6				
Millitary Reserve			44	Water	0.5				
Millitary Reserve			54	Water	0.1				
Millitary Reserve			56	Water	0.1				
Millitary Reserve			59	Water	0.7				
Millitary Reserve			62	Water	0.5				
Millitary Reserve			63	Water	0.4				
Millitary Reserve			65	Water	0.1				
Millitary Reserve			66	Water	0.5				
Millitary Reserve			67	Water	0.2				
Millitary Reserve			68	Water	0.2				
Millitary Reserve			69	Water	24.9				
Millitary Reserve			70	Water	0.1				
Millitary Reserve			73	Water	0.5				
Millitary Reserve			75	Water	0.7				
Millitary Reserve			79	Water	0.0				
Millitary Reserve			81	Water	0.2				
Millitary Reserve			89	Water	0.3				
Millitary Reserve			90	Water	5.5				
Millitary Reserve			91	Water	0.8				
Millitary Reserve			92	Water	8.9				
Millitary Reserve			93	Water	1.3				
Millitary Reserve			94	Water	1.9				
Millitary Reserve			95	Water	1.3				
Millitary Reserve			96	Water	2.7				
Millitary Reserve			97	Water	0.4				
Millitary Reserve			98	Water	3.3				
Millitary Reserve			99	Water	0.2				

Appendix 4. (cont'd).

Pasture	TU ID	PLY ID	Treatment	Encr	Area (ha)	TU Total	Class Sub-total	Class Total	Total
Millitary Reserve		100	Water		0.1				
Millitary Reserve		101	Water		0.4				
Millitary Reserve		102	Water		0.4				
Millitary Reserve		103	Water		1.4				
Millitary Reserve		104	Water		0.5				
Millitary Reserve		105	Water		0.1				
Millitary Reserve		106	Water		0.3				
Millitary Reserve		107	Water		0.2				
Millitary Reserve		108	Water		0.2				
Millitary Reserve		111	Water		1.0				
Millitary Reserve		113	Water		0.1				
Millitary Reserve		114	Water		2.3				
Millitary Reserve		116	Water		0.1				
Millitary Reserve		119	Water		0.0				
Millitary Reserve		120	Water		0.1				
Millitary Reserve		121	Water		0.3				
Millitary Reserve		122	Water		0.3				
Millitary Reserve		157	Water		19.2				
Millitary Reserve		159	Water		0.2				
Millitary Reserve		160	Water		19.3				
Millitary Reserve		191	Water		6.4				
Millitary Reserve		192	Water		0.7				
Millitary Reserve		198	Water		2.2				
Millitary Reserve		203	Water		0.1				
Millitary Reserve		204	Water		0.4				
Millitary Reserve		206	Water		0.2				
Millitary Reserve		210	Water		0.1				
Millitary Reserve		219	Water		0.0				
Millitary Reserve		234	Water		0.4				
Millitary Reserve		235	Water		0.9				
Millitary Reserve		236	Water		0.7				
Millitary Reserve		238	Water		0.2				
Millitary Reserve		239	Water		0.4				
Millitary Reserve		240	Water		2.9				
Millitary Reserve		241	Water		3.7				
Millitary Reserve		243	Water		0.6				
Millitary Reserve		244	Water		0.3				
Millitary Reserve		247	Water		0.2				
Millitary Reserve		248	Water		0.1				
Millitary Reserve		249	Water		0.6				
Millitary Reserve		250	Water		0.4				
Millitary Reserve		251	Water		0.2				
Millitary Reserve		252	Water		0.4				
Millitary Reserve		253	Water		1.6				
Millitary Reserve		254	Water		3.3				
Millitary Reserve		255	Water		0.1				
Millitary Reserve		257	Water		0.6				

Appendix 4. (cont'd).

Pasture	TU ID	PLY ID	Treatment	Encr	Area (ha)	TU Total	Class Sub-total	Class Total	Total
Millitary Reserve		258	Water		3.8				
Millitary Reserve		260	Water		0.1				
Millitary Reserve		261	Water		0.3				
Millitary Reserve		262	Water		0.6				
Millitary Reserve		263	Water		1.1				
Millitary Reserve		264	Water		5.4				
Millitary Reserve		266	Water		0.7				
Millitary Reserve		268	Water		2.6				
Millitary Reserve		269	Water		5.4				
Millitary Reserve		270	Water		1.6				
Millitary Reserve		271	Water		2.7				
Millitary Reserve		272	Water		7.9				
Millitary Reserve		273	Water		0.2				
Millitary Reserve		274	Water		0.1				
Millitary Reserve		275	Water		0.2				
Millitary Reserve		276	Water		1.0				
Millitary Reserve		119	Water		1.5				
							246.7		
								246.7	
Pasture Total									5794.0
Sword Creek		544	CF		2.1				
Sword Creek		564	CF		2.5				
Sword Creek		565	CF		5.4				
Sword Creek		582	CF		3.2				
Sword Creek		589	CF		3.5				
Sword Creek		624	CF		5.1				
Sword Creek		633	CF		1.3				
Sword Creek		635	CF		4.7				
Sword Creek		636	CF		0.2				
Sword Creek		645	CF		43.0				
							71.1		
								71.1	
Sword Creek	1	596	OR	Yes	3.4				
Sword Creek	1	584	OR		84.6				
							88.0		
								88.0	
Sword Creek	2	563	OR/OF	Yes	16.3				
Sword Creek	2	616	OR/OF	Yes	17.1				
Sword Creek	2	628	OR/OF	Yes	4.5				
Sword Creek	2	634	OR/OF	Yes	8.8				
							46.6		
Sword Creek	2	622	OR/OF		13.2				
							13.2		
								59.8	

Appendix 4. (cont'd).

Pasture	TU ID	PLY ID	Treatment	Encr	Area (ha)	TU Total	Class Sub-total	Class Total	Total
Sword Creek		246	Water		5.0		5.0	5.0	
Sword Creek		226	Wetland		5.7				
Sword Creek		245	Wetland		2.7				
Sword Creek		245	Wetland		3.5		11.9	11.9	
Sword Creek		609	PL		112.5		112.5		
Sword Creek		227	Water		8.7				
Sword Creek		256	Water		0.3				
Sword Creek		246	Water		0.6		9.6		
Sword Creek		245	Wetland		4.4		4.4	126.5	
Pasture Total									362.2
Till Lake		511	CF		4.7				
Till Lake		569	CF		1.6				
Till Lake		619	CF		6.3				
Till Lake		621	CF		21.3				
Till Lake		623	CF		1.5				
Till Lake		684	CF		44.9				
Till Lake		707	CF		910.3				
Till Lake		576	CF		5.3				
Till Lake		579	CF		2.1				
Till Lake		665	CF		4.2		1002.3	1002.3	
Till Lake	2	691	OF	Yes	3.0				
Till Lake	2	697	OF	Yes	5.3				
Till Lake	2	698	OF	Yes	39.7		48.0		
Till Lake	2	680	OF		10.3		10.3	58.3	
Till Lake	1	668	OR	Yes	15.1				
Till Lake	1	696	OR	Yes	1.4				
Till Lake	1	699	OR	Yes	31.0				

Appendix 4. (cont'd).

Pasture	TU ID	PLY ID	Treatment	Encr	Area (ha)	TU Total	Class Sub-total	Class Total	Total
Till Lake	1	724	OR	Yes	0.2				
						47.7			
Till Lake	4	608	OR	Yes	41.8				
Till Lake	4	614	OR	Yes	11.4				
						53.1			
Till Lake	6	566	OR	Yes	5.7				
Till Lake	6	571	OR	Yes	4.6				
						10.3			
							111.2		
Till Lake	1	663	OR		12.9				
Till Lake	1	681	OR		2.8				
Till Lake	1	689	OR		11.6				
Till Lake	1	700	OR		5.3				
Till Lake	1	723	OR		10.1				
						42.7			
Till Lake	3	620	OR		3.7				
Till Lake	4	557	OR		2.2				
Till Lake	4	591	OR		50.9				
						53.1			
Till Lake	6	510	OR		1.3				
Till Lake	6	536	OR		54.9				
						56.2			
							155.7		
								266.9	
Till Lake	5	674	OR/OF	Yes	110.1				
							110.1		
Till Lake	5	631	OR/OF		7.6				
							7.6		
								117.7	
Till Lake		151	Water		0.0				
Till Lake		153	Water		0.0				
Till Lake		155	Water		0.3				
Till Lake		156	Water		0.6				
Till Lake		199	Water		1.2				
Till Lake		201	Water		0.1				
Till Lake		202	Water		4.4				
Till Lake		207	Water		0.3				
Till Lake		209	Water		0.8				
Till Lake		212	Water		0.1				
Till Lake		213	Water		0.3				
Till Lake		215	Water		0.4				
Till Lake		216	Water		0.7				
Till Lake		217	Water		0.3				

Appendix 4. (cont'd).

Pasture	TU ID	PLY ID	Treatment	Encr	Area (ha)	TU Total	Class Sub-total	Class Total	Total
Till Lake		218	Water		0.1				
Till Lake		220	Water		0.1				
Till Lake		221	Water		0.0				
Till Lake		222	Water		9.3				
Till Lake		223	Water		0.2				
Till Lake		224	Water		0.4				
Till Lake		225	Water		0.5				
Till Lake		237	Water		3.8				
Till Lake		265	Water		3.4				
							27.4		
								27.4	
Till Lake		226	Wetland		0.9				
Till Lake		226	Wetland		0.1				
							0.9		
								0.9	
Till Lake		612	PL		2.2				
							2.2		
								2.2	
Pasture Total									1475.7
TLC Bull Pasture		481	CF		5.6				
TLC Bull Pasture		506	CF		10.8				
TLC Bull Pasture		605	CF		68.0				
							84.3		
								84.3	
TLC Bull Pasture	1	487	OR		0.1				
TLC Bull Pasture	1	554	OR		3.6				
TLC Bull Pasture	1	602	OR		43.7				
							47.3		
								47.3	
TLC Bull Pasture		388	PL		19.1				
TLC Bull Pasture		389	PL		44.8				
TLC Bull Pasture		454	PL		38.1				
TLC Bull Pasture		455	PL		24.8				
							126.8		
								126.8	
Pasture Total									258.5
Range Unit Total									19095.7

Appendix 5. Photopoints.



Becher Prairie – Leech Lake – TU2 - 160°



Becher Prairie – Till Lake – TU1 – 260°



Becher Prairie – Becher East – TU6 - 100°



Becher Prairie – Sword Creek – TU1 - 350°



Becher Prairie – Becher Middle – TU3 - 195°



Becher Prairie – Becher Middle – TU5 - 150°



Becher Prairie – Holding Ground – TU1 - 120°



Becher Prairie – Military Reserve – TU2 - 120°



Becher Prairie – Becher West – TU2 - 360°



Becher Prairie – Grazing Lease #1 – TU1 - 320°