

**RANGELAND  
MANAGEMENT RECOMENDATIONS  
FOR EUCHINIKO SIDEHILLS  
PROPOSED SENSITIVE AREA**



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For Donna Thornton  
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## ABSTRACT

Bio-Geo Dynamics Ltd. devised a naturalness rating system and produced a naturalness rating map for ecosystems in the Euchiniko Grasslands Proposed Sensitive Area during the summer of 2004. The naturalness rating system and mapping utilized a prior ecosystem classification and mapping of newly defined grassland ecosystems, completed earlier by Bio-Geo Dynamics Ltd. The naturalness rating system has been used help identify and highlighting areas of management concern in the Euchiniko Sidehills area. Areas of concern and management recommendations for them, are addressed in this report.

The Euchiniko Sidehills Proposed Sensitive area is located in the southwest corner of the Vanderhoof Forest District and is part of an existing range tenure. The overriding range management concern in the project area was forest invasion of existing grassland areas.

The naturalness rating of all ecosystems, both forested and non-forested, was assessed using the newly developed naturalness rating system of Simonar and Migabo, 2004. The naturalness rating system is comprised of two components. It rates the present ecosystem health or present condition of the ecosystem. In this regard it is similar to other rangeland rating systems. In addition to this, rangeland naturalness measures ecosystem stability or the ability of the ecosystem to maintain its present ecosystem successional state.

The ecosystem naturalness rating mapping identified a mesic/submesic grassland - aspen forest complex in the east of the of the study area with a low naturalness rating. Grasslands in this area are undergoing rapid conversion to aspen forest. Controlled burning in this area will greatly enhance domestic ungulate forage opportunities through arresting and turning back aspen encroachment and improving forage quality through creation and maintenance of a desirable grassland seral stage. In the east half of the study area, as well, there is a complex of subxeric/submesic open aspen forest and open grasslands with a good naturalness rating. This includes gently to moderately sloping areas accessible to cattle. A controlled burn on these sites will help to arrest moderate aspen encroachment on grassland areas and has potential to convert the present pinegrass dominated grass/forb understory to one more dominated by more palatable grasses including slender wheatgrass and pumpelly brome.

There are several other grassland ecosystems in pristine to excellent naturalness condition. These ecosystems do not require prescribed burning at this time. Both treated and untreated grasslands and forested ecosystems should continue to be monitored for changes to ecosystem naturalness.

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# INTRODUCTION

## Background

The Euchiniko Sidehills Proposed Sensitive Area is located within the Kluskus Resource Management area, Southwest of Vanderhoof, B.C. It is a relatively small area comprising 910 ha. It was identified by the Vanderhoof Forest District as having potential for Sensitive Area status. The key feature of this area are the grassy south facing slopes, which stretch for approximately 14 km along the North side of the Euchiniko River.

The Euchiniko Sidehills Proposed Sensitive Area is currently included within a range tenure boundary. The grasslands, wetlands and surrounding parkland-like forested areas are a valuable domestic livestock grazing resource. This grassy area offers excellent wildlife foraging habitat. The surrounding mature conifer and deciduous forests provide good wildlife habitat. The grasslands and some of the forested areas represent rare or endangered ecosystems and may harbor rare or endangered plants and animal species. The open grassy slopes and the Euchiniko River system, which widens to several narrow lakes has a strong scenic appeal. In addition, the area is adjacent to areas of confirmed First Nations cultural importance.

In the year 2003 Bio-Geo dynamics Ltd. (Simonar and Migabo 2004) carried out a detailed survey of the study area. We classified the grassland ecosystems and completed ecosystem and terrain mapping for the area. We also carried out an audit of rare and endangered ecosystems and plant species. In the year 2004, Bio-Geo Dynamics Ltd. completed a naturalness rating assessment and mapping of the study area to help guide future management activities in the Euchiniko Sidehills.

The range naturalness rating system we devised was intended to be universal in scope, so that it could be applied for guiding range management decisions across the entire province. It is most effective when used in conjunction with a functional, formal, rangeland classification system. However, it has also been designed as a broad guide for areas of the province in which potential rangeland ecosystems have not been adequately classified or, in most cases, not classified at all.

The range naturalness rating system has two components: ecosystem stability and range health. Ecosystem stability refers to the successional state of any specific potential range ecosystem and how persistent that ecosystem stage is. It can be applied to grasslands, shrublands as well as forested ecosystems. Range health is the other component of the naturalness rating system. Range health is the measure of the functioning of the successional stage of a rangeland ecosystem, at a point in time, related to its pristine state. Disturbance factors, primarily grazing and fire, affect the range health and also have an impact on the ecosystem stability component of ecosystem naturalness.

## Project objectives

The primary management concern in the Euchiniko Sidehills area is aspen forest encroachment on existing grasslands. There is a desire to maintain and expand the grassland area through prescribed burning. Using the naturalness rating mapping as a management tool, we identified areas of management concern and areas with active management potential. This report, with the aid of the ecosystem naturalness map, prioritizes areas for future management action and makes recommendations for management procedures to maintain and enhance domestic forage opportunities, while at the same time maintaining and accounting for other natural resource and cultural values.

## Location of the Study Area

The study area is located 70 km almost due south of Vanderhoof B.C., at the southeast margin of the Vanderhoof Forest District where it adjoins the Quesnel Forest District to the south (Figure 1).

The Euchiniko Sidehills Proposed Sensitive Area (ESPSA) is located primarily on the steep south facing hillside on the north side of the Euchiniko River Drainage. The southern boundary of the study area follows the Euchiniko River, which widens at regular intervals into a string of narrow lakes. The northern boundary follows the edges of cutblocks as well as the major grade break on the northern side of the river valley. The area can be accessed from the Kluskus Forest Service Road. Access from the north is provided via the Gold Road that exits the Kluskus FSR at 16km near Hay Lake. The area can also be reached from the south via a series of cutblocks that are accessed east off the Kluskus FSR.

Natural and manmade grassy/shrubby openings are scattered intermittently along this 14 km stretch of the Euchiniko River. Mature pine, white spruce and aspen forests surround the openings. Based on the diversity of ecosystems, the study area exhibits excellent wildlife habitat values.

The area has been grazed since the early 1900s and has undergone recent prescribed burning. The area also has high potential archeological values since First Nations village sites and artifacts have been found just to the east. The study site is included within a larger area jointly claimed as traditional territory by both the Lhoosk'us (Kluskus) Nazko and SaiKuz (Stoney Creek) First Nations.

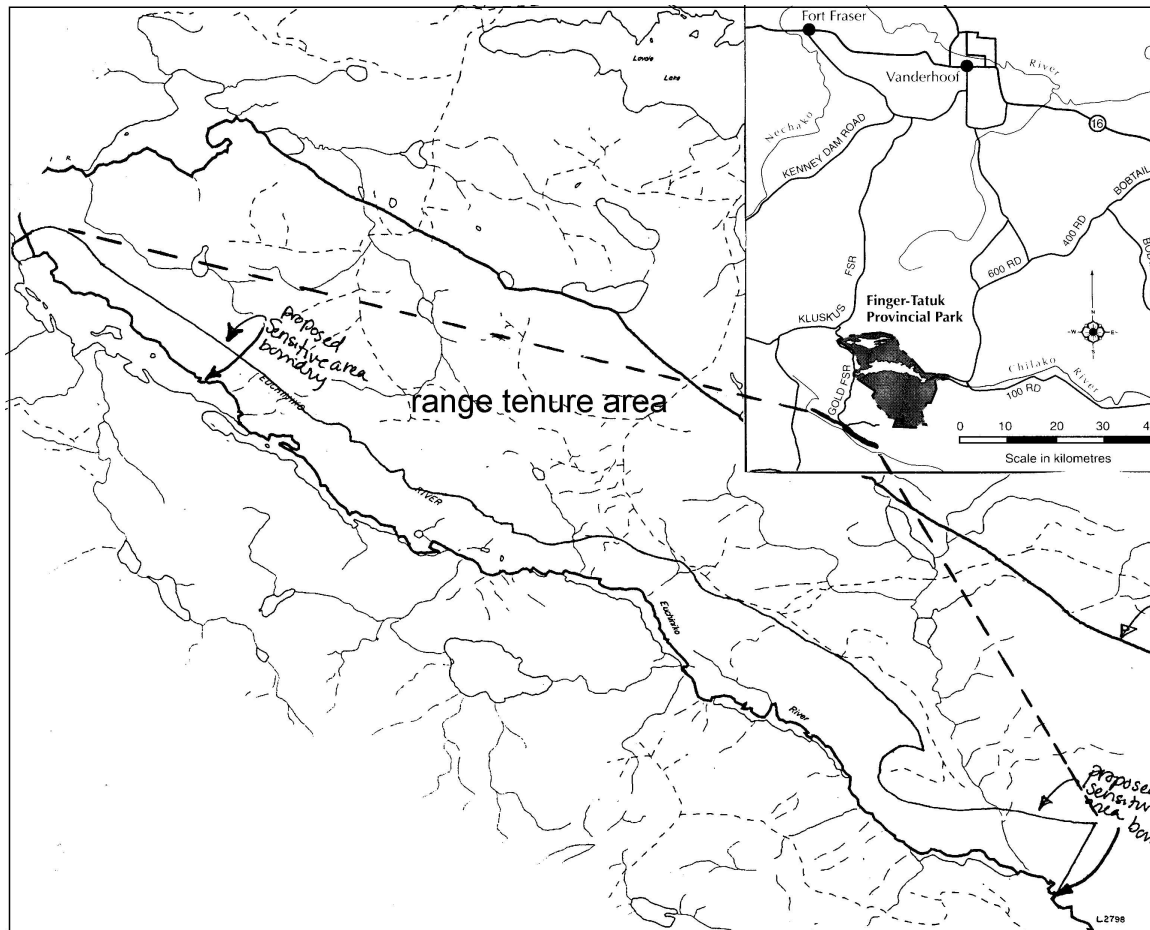


Figure 1. Euchiniko Sidehills Proposed Sensitive Area Location Map

## Methods and Materials

### Background Materials

The key background resource used in identifying areas of management concern was the rangeland naturalness map produced by Simonar and Migabo, 2004b. The bio-physical survey, grassland ecosystem classification and ecosystem mapping of the site compiled in by Simonar and Migabo 2004a, provided an important background resource as well. Donna Thornton (Prince George MWLAP ecologist) provided the project terms of reference as stated in the Request for Proposals and in the contract.

### Methodology

Bio-Geo Dynamics Ltd carried out an analysis of the naturalness rating map in order to identify and prioritize areas that required active management intervention to protect and enhance the range resource. At the same time, other areas were identified that were best left in their present

state, in order to protect other resource values. From this analysis a management priority map was produced comprised of three rating categories including : high, medium and low.

The rules for management prioritization were as follows:

- 1) Ecosystems with a Pristine or Excellent naturalness rating require no present management intervention and are therefore rated as a low management priority  
These areas include all conifer and mixed conifer-deciduous stands which are only marginally utilized by cattle, as well as non-forest ecosystems which are inaccessible to or not utilized by domestic stock. All of these forested and non-forested ecosystem contribute to biodiversity of the study area, may be important to local wildlife populations, are relatively stable at this time, and some of the ecosystems including wetlands, grasslands, shrub ecosystems and “non-vegetated” ecosystems including rock bluffs, have the potential to harbor rare and endangered plant and animal species.
- 2) Ecosystems with a Good naturalness rating. Ecosystems in this category may benefit from some type of active management intervention depending on management priorities, now and in the future. These include ecosystems with some moderate ecosystem stability and/or range condition issues, which may include aspen ingress on native grassland areas and/or light to moderate domestic livestock grazing pressure. Some of these may include rare and endangered grasslands. These ecosystems in turn may harbour rare or endangered plant species.
- 3) Ecosystems with a poor or severely degraded naturalness rating. These ecosystems are a high active management priority, and would highly benefit from immediate active management activity. These ecosystems include both grasslands and aspen forest which are lightly to heavily grazed by cattle. This includes seral grasslands which are unstable by virtue of being rapidly invaded by aspen forest.

General management recommendations are given for each priority class of rangeland within the study area. For the most part, these recommendations deal with the use of prescribed fire and monitoring to manage the rangeland resource, and secondarily on grazing management and other management activities.

In the Euchiniko Sidehills, a range of grasslands are represented. The grasslands represented include: edaphic climax grasslands; grasslands that are a disturbed seral stage of edaphic climax grasslands and grasslands which are early seral stages of forested ecosystems. All of these ecosystems have been exposed to a frequent fire return rate in the past. This is also true of the aspen forests within the study area. Some of the edaphic climax grasslands, under the present “unnatural” fire suppression regime, are at risk of progressing towards shrub ecosystems and possibly forest ecosystems.

## Results and Discussion

### Review of Ecosystem Successional Stability Component of Naturalness Rating

In the absence of ingress from forest or brush species, the rangeland health the percentage rating equals grassland naturalness. Where tree or shrub invasion is compromising the stability of grasslands then we add another stability factor to arrive at a final naturalness rating. In the context of the major current rangeland management concerns of aspen encroachment onto grasslands, in the Euchiniko, it is pertinent to review ecosystem stability in the Euchiniko

Rangeland health does not give a precise account of successional state. In particular it does not assess the ability of grassland to withstand encroachment by shrub and forest communities of a range ecosystem, for example, some absolutely pristine grassland ecosystems can succumb to forest where fire has been unnaturally excluded. Successional status and stability of successional stages are important considerations when assessing grasslands naturalness.

Natural grasslands are subject to a natural disturbance regime. In British Columbia wildfire is the most common and widespread disturbance agent in the landscape. The absence of fire in native grasslands is “unnatural”. The absence of fire can lead to “unnatural” successional trajectories which result in grassland invasion by forest and shrub. As a result, many native grassland areas in Central and northern B.C. are now at risk from forest encroachment. This stability is a function of the change in length of the fire return rate, and the intrinsic ability of an edaphic climax ecosystem to withstand woody vegetation encroachment.

We have identified three levels of grassland stability in the Euchiniko Sidehills area.

Stable: The ecosystem is very stable and is able to withstand forest encroachment for many decades perhaps hundreds of years in the absence of fire. For the most part these ecosystems occupy sites which are naturally extremely limiting to the establishment of trees. For these ecosystems grassland naturalness rating equals rangeland health rating. A stable condition is indicated by the absence of trees or shrubs or where trees and shrubs occur along the perimeter of the grassland, there is a sharp boundary between an even aged forest stand and pure grassland.

Moderately stable: Invasion of the forest occurs over many decades but less than hundreds of years in the absence of fire. These ecosystems occupy sites which are marginal for forest growth and establishment but under a natural fire return regime will remain grasslands almost indefinitely. For these ecosystems, grassland naturalness rating equals one naturalness rating class less than the calculated rangeland health category. Characteristics of moderately stable ecosystems include area where ingress of different vegetation cover class(s) is sharply clinal (if tree species) or scattered (if shrubs) with no significant invasion beyond perimeter of the invasion.

Unstable: Invasion of forest can occur over only a few decades. These ecosystems are dependant on disturbance for their existence and may be relatively long lived under a closely repeated fire regime. This class of ecosystems should not be considered natural grasslands but either fire disclimaxes and/or persistent seral stages of forest ecosystems. In this instance the grassland naturalness rating equals two naturalness ratings less than that calculated by rangeland health category. Unstable grassland ecosystems are indicated when ingress of different vegetation cover class(s) is not sharply clinal and is continuous with few gaps. Outliers of invading woody species may occur beyond the perimeter of the main invasion loci.

An important aspect of the rangeland naturalness rating system is that the scope of the rating system has been expanded to include forested ecosystems and cultivated/tame pasture. This recognizes that tame pasture and forest areas are important rangeland components. In the context of naturalness, one must assume what the wild ecosystem potential of the site was. This can be done by assessing historical records and/or the site and soil indicators present in relation to the forest/native grassland ecosystem potential. Tame pastures seldom if ever revert completely back to the potential native pasture; several scenarios are possible and are discussed later. This situation was not encountered in the Euchiniko Sidehills study area but is possible and is common elsewhere.

Climax ecosystem successional stage is the standard against which the condition and stability of any seral stage is compared. In general, seral stages are less stable in terms of potential longevity and of self sustaining ecosystem function. Therefore seral stages of any climax ecosystem can be assigned a naturalness rating of up to two naturalness classes lower than that of the climax state. Some seral stages are more long lived than others and may have different management goals and objectives attached. Depending on management concerns, modification of naturalness rating (and implications to rangeland health management) helps to focus on seral stages which might require special management consideration.

An example of this in the Euchiniko Sidehills area are significant numbers of open grassy aspen groves which are late to mid seral stages of would could be mesic or drier white spruce dominated ecosystems. Even though some of these sites have no evidence of cattle grazing and are “natural”, in of themselves, controlled fire range management considerations and outcomes will be drastically different for seal and climax stages. In our study we have modified the naturalness rating of these aspen stands to highlight their potential for temporarily enhancing grazing potential through controlled fire.

For more detailed information on the naturalness rating system refer to Simonar and Migabo 2004b.

## A Brief Review of Grassland/Shrub Ecosystems Found in the Euchiniko Sidehills Area

To put our management priorities and management recommendations in context, we require a knowledge of what ecosystems are present, what is their distribution, what their nature is, how are they interrelated and how they will respond to management operations. We therefore present here a brief review of the grassland and shrub ecosystems found within the study area.

A grassland classification for the area was virtually non-existent yet we have been required to make ecosystem based management recommendations for existing grasslands within the study area. One ecosystem, the SBSdk-81 (SW) (Saskatoon – wheatgrass Shrub Steppe) has been described and fits shrub ecosystems observed within the study area. The other available classified ecosystem unit, the SBSdk-82 (BW) (Bluegrass-Slender wheatgrass), does describe a disturbed seral stage of one of the grassland ecosystems present, however it is not adequate to map, and to describe and understand the ecology of all the grassland ecosystems that we studied.

It is highly desirable to classify these ecosystems within the context of the existing BEC classification system. Although in reality these grassland ecosystems are part of an environmental continuum, we were able to identify discrete ecosystem units based on differences in site characteristics and site potential and on floristic composition. The BEC classification system is based on being able to recognize climatic/edaphic climax plant communities. We were very fortunate that, for a number of reasons, substantial amounts of most ecosystems and sometimes whole ecosystems are presently in a close to natural or undisturbed condition. Several areas of specific ecosystems have been modified /disturbed by cattle grazing.

We are able to identify six discreet long-lived grassland and shrub ecosystems within our study area. Several of them are edaphic climax ecosystems while others are disclimax ecosystems or successional stages of climax or disclimax ecosystems and finally some are or long lived seral stages of forest ecosystems. Several ecosystems occupy the same site type, or have overlapping site potentials but have developed different plant assemblages on equivalent sites. Disturbance history and the nature and availability of invaders/colonizers from adjacent sites play an important role in ecosystem development.

These ecosystems are summarized in the edatopic grid, Figure 2. The identification of and the relationships between ecosystems are presented in a flow chart (Figure 3) which summarizes the analysis contained in each detailed ecosystem description. Figure 4 shows a typical topographic cross-section displaying the distribution of ecosystems across the landscape. Ecosystem sensitivity is presented in Table 6. For a more detailed description of ecosystems within the Euchiniko Sidehills area, please refer to Simonar and Migabo (2004a).

Figure 2. Euchiniko SBSdk Grassland Edatopic Grid

		Soil Nutrient Regime				
		A	B	C	D	E
Moisture Regime Very Xeric	0					
Xeric	1			SW (81)		P W
Subxeric	2			NT PK		
Submesic	3					NW BW (82)
Mesic	4				PP AM	
Subhygric	5				CA	
Hygric	6					
Subhydric	7					

SW (81): Saskatoon – Slender wheatgrass (shrub/steppe)

PW : Pasture sage – Slender wheatgrass (grassland)

NT : Needlegrass – Timber oatgrass (grassland)

PK : Pine grass – Kinnikinnick (grassland)

NW : Needlegrass Slender wheatgrass (grassland)

BW (82): Bluegrass – Slender wheatgrass (grassland)

PP : Pumpelly brome – Peavine (grassland)

MA : Aster – Meadowrue – Peavine – Fireweed (mesic herb meadow)\*

CA : Cow parsnip – Large leaved avens (moist herb meadow)\*\*

\* Superficially similar to the PP ecosystem but not identified in the study area.

\*\* Observed in the area of the Euchiniko Sidehills and therefore included in the discussion.

Figure 3: Euchiniko SBSdk sites series and seral ecosystem key

1a Vegetation dominated by stunted shrubs or if not, some stunted shrubs usually present. Timber oatgrass or Pinegrass either not present or minor component of herb cover. Slender wheatgrass and Rocky Mountain fescue and nodding onion always present, often prominent. Pasture sage is present on grass-dominated sites. Asters are not present or have insignificant cover. Mostly very thin gravely rubblely soils developed on thin colluvial veneers over base rich bedrock or base rich weathered bedrock. They are very xeric to subxeric. Almost always there is a warm slope and steep aspect. If deep, soils are then base rich, usually very coarse textured, on very steep warm aspect crest to upper slope.

2a Shrub cover is greater than 25%. Usually occupies crest to upper slope position. Soils are mostly less than 30 cm. over bedrock. Dwarf saskatoon and snowberry are dominant shrubs. Slender wheatgrass is present, sometimes with high cover.

**SBSdk-81 (SW) - edaphic climax**

2b Shrub is cover less than 25%. Soils are very shallow (20-40cm), on steep warm aspect upper slopes. Pasture sage and nodding onion are usually always present and often with high cover. Needle grasses and slender wheatgrass are the dominant grasses. Rocky mountain fescue has greater than 1% cover. Bluegrass species are minor components of herb layer.

**SBSdk-00 (PW) - edaphic climax**

1b. Shrubs are not dominant. Pasture sage and nodding onion are usually not present or have an insignificant cover. Pinegrass and oatgrass are sometimes dominant covers. Asters are most often present and often have significant cover. Mostly deep soiled subxeric to subhygric grasslands or forb dominated plant communities. Terrain materials are variable. Slopes range from steep to level. Slopes are mostly warm aspect, never a cool aspect. If soils are shallow to bedrock they are usually deeper than 20 cm and on mid to lower slopes.

3a Submesic to Subxeric dry grasslands, that have dwarf blue berry always present and with significant cover. Either pinegrass or timber oatgrass are dominant or have high covers. Lichens are present, sometimes with high covers. Sometimes found on rapidly drained very dry, very coarse gravelly inactive fluvial or glaciofluvial deposits.

4a This is a very dry grassland. Oatgrass along with needlegrasses are either the most dominant grasses or among the most dominant grasses. Pinegrass if present, has insignificant cover. Wheatgrass usually has significant cover. Often has high *Cladina* lichen cover. Found on very coarse gravelly fluvial or glaciofluvial outwash.

**SBSdk-00 (NT) – Edaphic climax**

- 4b This is dry grassland. Pinegrass is the dominant grass. Rice grasses are usually present as well. Pine and aspen regeneration are common on these sites. Bearberry is present and has high cover. Pasture sedge is not present or has low cover.

**SBSdk-00 (PK) – moderately long lived seral stage of the 03(05) ecosystem.**

- 3b Mostly Subxeric to subhygric grasslands or forb dominated communities. Dwarf blueberry and lichens are usually not present and never with significant cover. Timber oatgrass or pinegrass are not present or if present, are never dominant grasses. They are never found on rapidly drained, very dry, very coarse gravelly fluvial or glacio-fluvial deposits, otherwise found on variable terrain.

- 5a Subxeric to submesic grass dominated ecosystem with abundant needle grasses, and wheatgrasses. On undisturbed sites bluegrass species are relatively unimportant whereas on disturbed sites various bluegrasses (including Kentucky bluegrass) are prominent. They occur mostly on medium textured soils on variable terrain though usually on warm aspects.

- 6a Subxeric to mesic undisturbed native grassland dominated by slender wheatgrass and needlegrasses. Pumpelly brome is also common. Minor covers of other native grasses also occur, including bluegrasses, fescues, spike trisetum, timber oatgrass as well as dry-land sedges. Mostly on steep warm aspects on steep mid to lower slopes on fairly deep medium textured weathered colluvial deposits. Very rare in natural condition on other terrain types.

SBSdk-00 (NW) - Disclimax/edaphic climax

- 6b Subxeric to mesic disturbed naïve grassland dominated by agronomic species including Kentucky bluegrass, timothy, creeping red fescue. Native bluegrasses and bromes are increasers on these sites. Usually warm aspects on mostly medium to fine textured materials on variable terrain types

SBSdk-82 (BW) – persistent seral (disturbed) stage of NW

- 5b Mesic to hygric, Forb dominated ecosystems with a wide variety of grasses, which are never dominant. Some sites have become dominated by agronomic grass species including Kentucky bluegrass, Timothy and Bromes.

- 7a Subhygric to hygric meadows dominated by forbs. Dominant forbs include: cow parsnip, meadowrue, stinging nettle and large leaved avens. Typical grasses include bluestem, blue wildrye and Bromes.

Mostly on level inactive fluvial deposits with fine to medium textured capping over coarse gravelly materials.

SBSdk-00 (CA) Disclimax/ persistent seral stage of 06/07

7b Mesic herb meadows dominated by forbs.

8a Mesic Forbs including various asters, fireweed, meadowrue, peavine, northern bedstraw, and miscellaneous grasses common to open mesic forests including blue wildrye, false melic, bluegrasses and sedges. Found on similar sites to CA except drier, less lush and more species diverse.

SBSdk-00 (MA) Disclimax/persistent seral stage of 01/06 ecosystems

8b Mesic forb meadow dominated by various forbs similar to MA however proximity to existing grasslands results in enrichment of classic grassland grass species including slender wheatgrass, needlegrass and native bluegrasses. This ecosystem is found on deep medium textured moraine and sandy loam glaciofluvial materials on medium to gentle southerly aspects.

SBSdk-00 (PP) ephemeral /persistent seral stage of 01/06 ecosystems

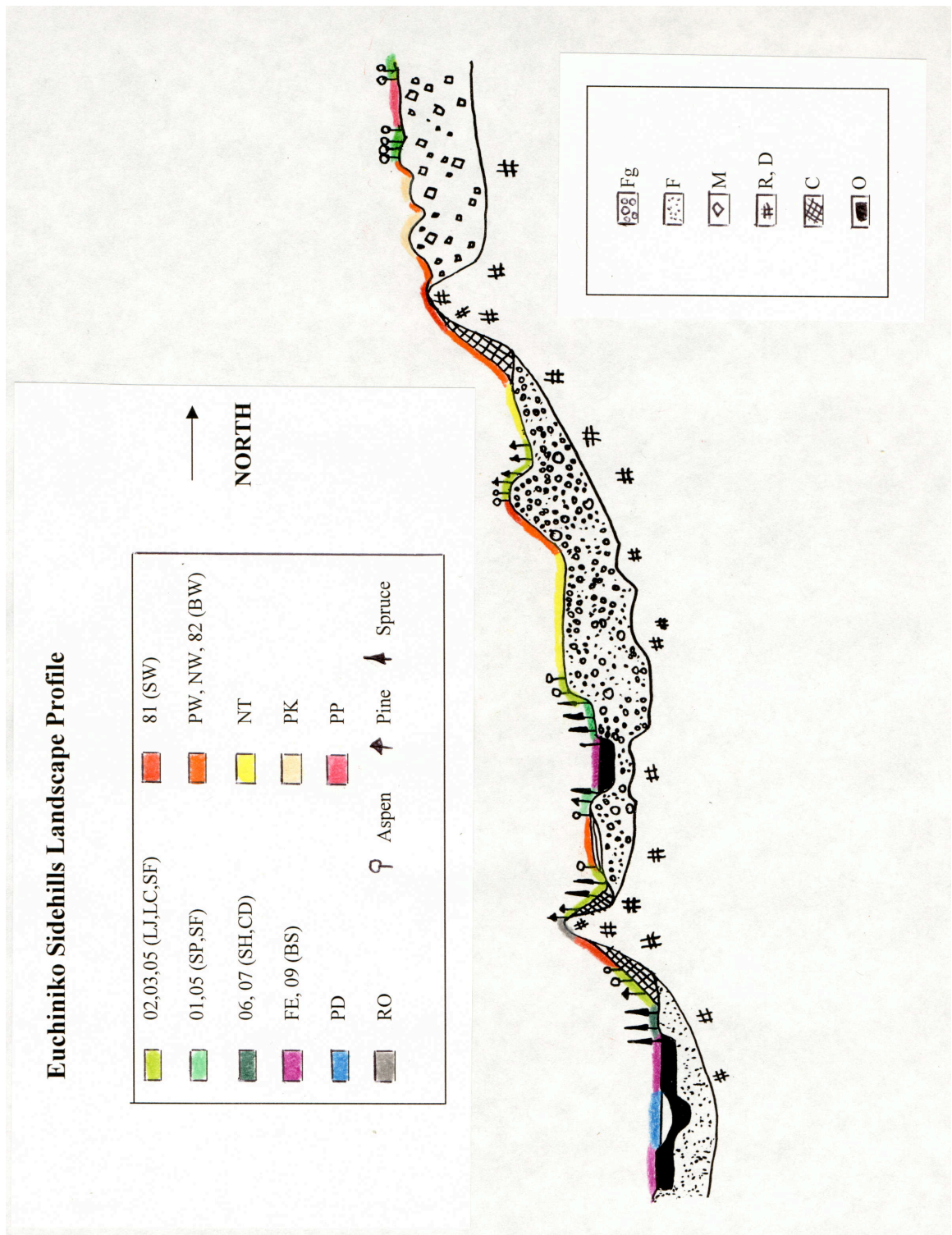


Figure 4. Cross section profile of ecosystems across the Euchiniko Sidehills study area

Table 1. Summary table of Ecosystem Stability within Euchiniko Sidehills

Non-Forest Ecosystem Rare [R] Endangered [E]	Impediments to Forests					Successional Status	Longevity	Sensitivity to Disturbance		
	Limiting soils	Grazing	Cold Air Ponding	Fire	Vegetation Competition			Fire	Soil Deg	Plants At Risk
Saskatoon – Slender wheatgrass (shrub – Steppe) [E]	Very dry Very Shallow Soils	Minor	None	High	Moderate Shrubs and grasses	Edaphic climax	Extremely Long – many hundreds of years	Mod	High	Mod
Pasture sage – Slender wheatgrass grassland [Recommend E]	Very dry Very shallow soils	Minor	None	High	Moderate/ high grasses	Edaphic climax	Extremely Long – many hundreds of years	Mod /low	High	Mod
Needlegrass – Slender wheatgrass grassland [Recommend E]	Some dry shallow soils	Low	None	High	Very High (grasses)	Fire disclimax/ Edaphic climax	Very Long – several hundred years	Low	Mod	Very high
Bluegrass – slender wheatgrass grassland [E]	No	High	Minor	High	Very High (grasses)	Grazing disclimax/ Long lived seral form of NW	Long – several hundred years	Low	Mod	Critical
Needlegrass - Timber oatgrass grassland [Recommend R]	Very dry gravelly soils	Moderate/ High	Moderate	High	High (grasses)	Edaphic climax/ (Fire disclimax)	Very Long - several hundred years	Low / Mod	Low / Mod	High
Pinegrass – Kinnikinnick grassland [Recommend R]	Some Mod Coarse to shallow soils	Moderate	Low/ Moderate	High / Mod	High/ Mod (grasses)	Fire disclimax/ persistent seral	Fairly Long - two hundred years	Low / Mod	Mod	Mod.
Pumpelly Brome – Peavine herb meadow [Recommend E]	No	Moderate/ High	Moderate	High / Mod	Very High (forbs and grasses)	Persistent seral	Moderately long one hundred years	Low	Mod	Mod. / High
Aster – Meadowrue – Fireweed herb meadow* [Recommend E]	No	Moderate/ High	Moderate	Mod	Very High (forbs and grasses)	Avalanche/ fire disclimax/ persistent seral	Fairly long – two hundred years	Low	Mod	Mod/ High
Cow parsnip – Large leaved avens herb meadow *	No	Moderate/ High	High	Mod	Very High (Forbs and grasses)	Avalanche/fire disclimax long lived seral	Long – several hundreds years	Low	Low / Mod	Mod/ High

\* Observed close to the Euchiniko Sidehills study area

## Determination of Naturalness rating for ecosystems of Euchiniko Sidehills

The general results of naturalness rating for all ecosystems of the Euchiniko Sidehills is given below. These general ratings are based on representative point samples and on general observations and field notes. Where polygons contain an ecosystem complex then those polygons are assigned the lowest naturalness rating score. All ecosystems with the study area were assigned a naturalness rating. This included forested and “non-vegetated ecosystems listed in Table 2. Most of the forest ecosystems have been only marginally utilized by cattle. Grassy aspen forests including the site series 01, 03 and 05 were the most utilized by cattle and were the most modified. Grassland ecosystem naturalness rating is displayed in Table 3.

Table 2. Euchiniko Sidehills ecosystems naturalness rating for forest ecosystems

Ecosystem Identity	Successional Stage	Structural Stage	General Naturalness Rating	Comments
<i>Forest Ecosystems</i>				Forest Ecosystems have been defined in DeLong et al., 1993 Naturalness rating of ecosystems was based on field plot cards and notes including, vegetation, soil characteristics and cattle grazing pressure.
01(C)	YS Pl to MCC Sx	3-6	Excellent	Ecosystems in the east end of the study are not being grazed.
01(M)	YS to MS	3m-6m	Excellent	Ecosystems in the east end of the study are not being grazed.
01(B)	YS to MS	3b-6b	Good - Poor	<b>Good</b> in west half of study area, <b>good</b> in western end of east half of area and <b>poor</b> in east end of east half of study area. Directly related to local cattle grazing pressure and divergence from expected ecosystem composition
02(C)	YS to MS	3-6	Excellent	Mostly steep rocky sites with no cattle grazing
02(M)	YS to MS	3-6	Excellent	Mostly steep rocky sites with no cattle grazing
02(B)	YS to MS	3-6	Excellent	Mostly steep rocky sites with no cattle grazing
03(C)	YS MS and MEC	4-6	Excellent	Mostly steep sites with no cattle grazing
03(M)	YS to MS	4-6	Excellent	Some <b>good</b> sites on gentle relief in east end of study area with light browsing
03(B)	YS to MS	4-6	Good - Excellent	Minor areas of <b>excellent</b> with steep slopes and no cattle grazing
05(C)	YS to MS and MCC	4-6	Excellent	Minor cattle grazing
05(M)	YS to MS	4-6	Excellent	Minor cattle grazing
05(B)	YS to MS	4-6	Good	Minor to moderate cattle grazing
06(C)	YC to MCC	5-6	Excellent	Minor cattle grazing in east end of study area
06(M)	MS	6	Excellent	Little or no cattle grazing noted
07(C)	MEC	6	Excellent	Minor cattle grazing
09(C)	MEC	6	Pristine	No cattle grazing
BF(C)	MEC	6	Pristine	No cattle grazing

\*Ecosystem modifiers for forested ecosystems: (C) = conifer, (M) =mixed Conifer-Aspen, (B)= Aspen

Table 3. Euchiniko Sidehills Ecosystems naturalness rating for non-forest ecosystems

<b>Ecosystem Identity</b>	<b>Successional Stage</b>	<b>Structural Stage</b>	<b>General Naturalness Rating</b>	<b>Comments</b>
				These ecosystems are described in more detail in Simonar and Migabo, 2004.
81	MEC	3a	Pristine - Excellent	Shrub/steppe on steep slopes inaccessible to cattle. Range health mostly pristine with minor forest ingress
PW	MEC	2	Pristine - Excellent	Pasture sage-Slender wheatgrass grassland on steep slopes almost entirely inaccessible to cattle range health is mostly pristine with minor shrub ingress on grasslands
NW	MEC	2	Excellent	Needlegrass-Slender wheatgrass grassland on mostly steep slopes inaccessible to cattle. Excellent health with no significant ingress yet by aspen.
82	MS	2	Severely Degraded	Bluegrass-Slender wheatgrass ecosystem. Long lived seral grassland stage of the NW, occurring on slopes accessible to cattle and moderately to heavily grazed. Poor to severely degraded health with moderate forest ingress – mostly aspen.
NT	MEC	2	Good	Needlegrass-Timber oatgrass grassland on slopes accessible to cattle. ecosystem moderately to lightly grazed. Good health no significant forest ingress
PK	MS	2	Good - Excellent	Pinegrass-Kinnikinnick persistent seral stage of 03 and 05 forest ecosystems. Pristine health in West half of study area and excellent health in east half but moderate forest encroachment in most areas.
PP	YS	2	Severely Degraded - Poor	Pumpelly brome-Peavine seral forb/grass seral stage of 01 forest ecosystem (health condition is good but very rapid aspen encroachment) therefore dominantly mapped as severely degraded
FE	MEC	2	Excellent	Sedge fen wetland found on organic soils is not grazed by cattle.
Rock	Non-vegetated	1	Pristine	Not affected by cattle
Pond	Non-vegetated	1	Excellent	Not significantly affected by cattle

## Naturalness Rating Map

The template for the naturalness rating map is an ecosystem site series map produced for the study area (Simonar and Migabo, 2003). A small scale map of the naturalness rating map is shown in Figure 5. A 1:20,000 scale has been produced and is found in Appendix 1.

The Naturalness Rating map polygons are numbered consecutively and have been generated from an excel database which contains the following records for each polygon: polygon number; ecosystem site series; terrain label; naturalness rating.

The naturalness rating map highlights both forest and non-forest dominated areas. The eastern half of the study area is presently more accessible to cattle and rangeland health has been impacted more significantly in this area. In addition, the past fire history has resulted in a greater proportion of fairly open aspen dominated forest ecosystems. The presence of seral aspen ecosystems and cattle grazing disturbance in much of the non-forested area and in the seral aspen ecosystems in the eastern half of the mapsheet have resulted in noticeably lower naturalness rating scores for that area.

## Management Recommendation Map

A management recommendation map has been produced. A small scale version is shown in Figure 6. A larger scale, 1:20,000 scale map is found in Appendix 2. A summary of naturalness map units in each management recommendation category is shown in Table 4 below

Table 4. List of naturalness polygon numbers within management recommendation categories

Polygon Naturalness Rating Type	Management Recommendation Category		
	Low	Medium	High
Forested Poor-Severely degraded (At Site Series 01 only)			178 moderate to heavy cattle grazing
Forested Good includes all At stands	193, 226, 228, 234, 236, 237, 239, 244, 245, 249, 250, 254, 382, 697, In West half on steep shallow soiled, very dry steep warm slopes - no cattle grazing	86, 97, 98, 133, 141, 149, 151, 162, 164, 179, 189, 224, 225, 289, 411, 473, 707 in east half on dry to moist moderately sloping deep to shallow soils, light cattle grazing	
Forested Excellent to Pristine Conifer and Mixed stands	All non-At stands, light to no cattle grazing		
Non – forested Poor to Severely Degraded PP ecosystem present			125, 125, 134 moderate to heavy cattle grazing
Non – forested Good	194, 197, 203, 209, 230, 246. No cattle grazing	89, 91, 92, 96, 110, 111, 113, 117, 126, 146, 147, 150, 152, 256 163, 286, 389, light to moderate cattle grazing	
Non – forested Excellent - Pristine	All RO, PD, FE, PW, SW site series plus PK site series in west half . No cattle grazing		

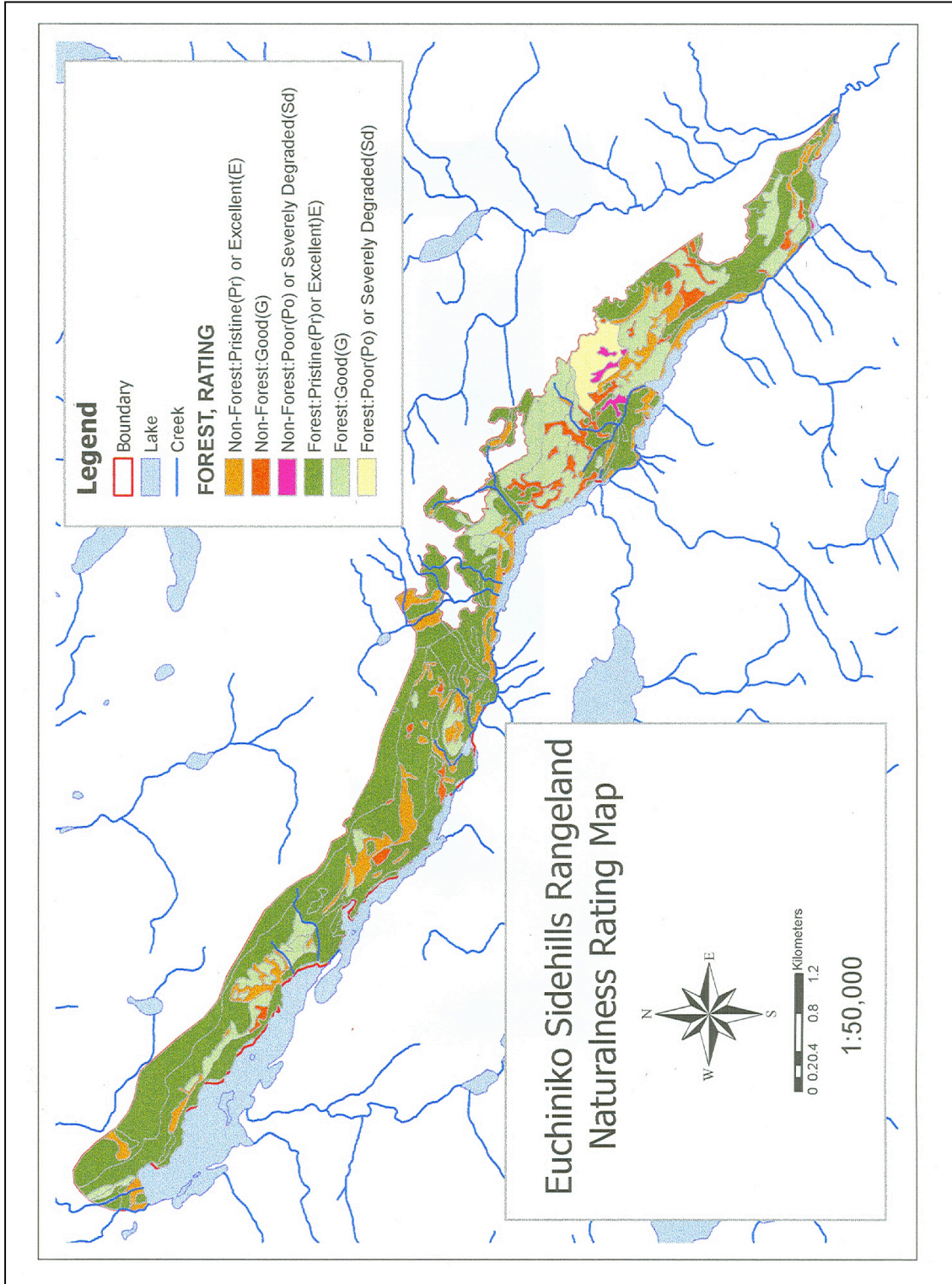


Figure 5. Euchiniko Sidehills Naturalness Rating Map.

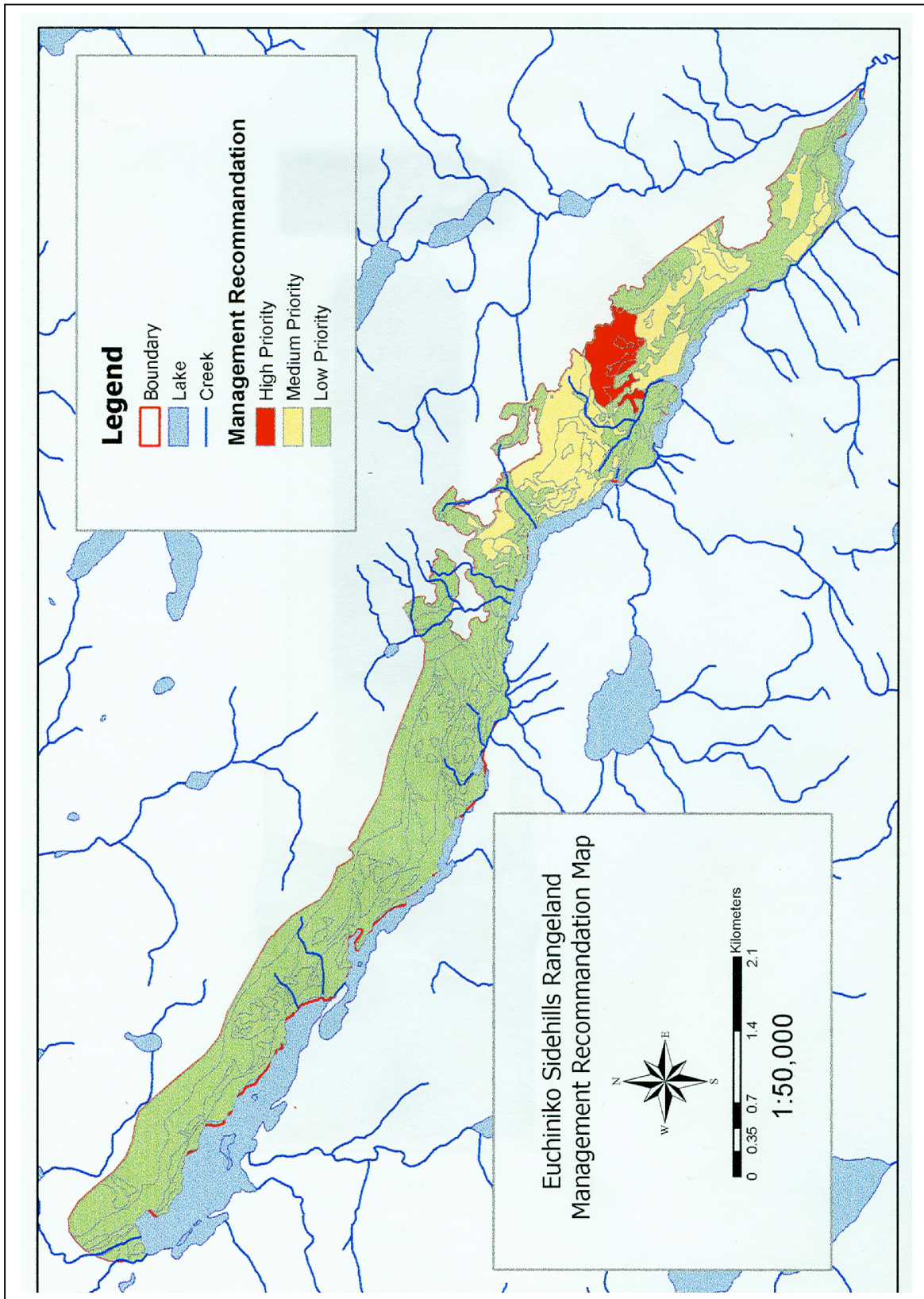


Figure 6. Euchiniko Sidehills Rangeland Management Recommendation Map

# Rangeland Management Recommendations for Euchiniko Sidehills

The Euchiniko Sidehills proposed sensitive area contains a unique mix of forested and rare non-forested ecosystems. The grassland areas of the Euchiniko are a valuable domestic livestock grazing area. Because of its high biodiversity and its unique ecosystems, the area, as a whole, has potentially very high wildlife habitat values. All native grasslands in this climatic zone fall under the rare and endangered category. In addition to this, there is potential for rare or endangered plant species being found within these grasslands. Pine forests within and surrounding the study area are currently being infested by a catastrophic bark beetle epidemic. Although no first nations cultural artifacts were noted, these also may be present within. All of these factors could potentially influence future management activities within the Euchiniko Sidehills Proposed Sensitive Area.

We undertook a study of the ecosystems (Simonar and Migabo, 2004a) and rated the naturalness of those ecosystems (Simonar and Migabo, 2004b). This has enabled us to in order to identify areas of management concern, and to understand the effectiveness and limitations to management activities within the study area. The overriding, present day, management concern is aspen encroachment on grassland areas. Current grazing pressure was not a significant management issue impacting resource values. There was no grazing in the west half of the study area. In the eastern half of the study area, most ecosystems, including the vast majority of the grazed area were only experiencing light to moderate grazing pressure.

Based primarily on naturalness rating and secondarily on accessibility to domestic livestock, we have divided the Euchiniko Sidehills Proposed Sensitive Area into low, medium and high priority management areas. These areas have differing naturalness ratings and will have differing sensitivities and responses to active management activities and in particular to prescribed burning.

## Management Recommendations for the high Priority Area

### Background

A high priority management area has been delineated on Figure 6 and in greater resolution on the map in Appendix 2. It is found on the upper part of the Sidehills in the east end of the study area, mostly on gentle slopes. This area is comprised of small ephemeral seral grassland patches with a complex of young and mature mesic/submesic aspen stands. These grasslands have been classified into a short lived grass-forb ecosystem which we have identified as the Pumpelly Brome – Peavine (PP) grassland ecosystem. Areas of this ecosystem have been heavily grazed by cattle with resultant local soil compaction of loamy basal tills as well as significant introduction of dandelion and agronomic grasses. These grasslands are presently undergoing rapid invasion by aspen and conversion into aspen forest. The neighbouring, mostly mesic-submesic aspen forests have a significant component of pumpelly brome and slender wheatgrass in the understory. These two grass species are amongst the most palatable, most favoured native

grasses for domestic stock in this area. Prescribed fire in this ecosystem complex will favour the spread of these two grass species and will arrest aspen invasion at least temporarily. Increasing the area and amount of preferred natural forage will help to disperse grassing pressure on the present small openings and allow the PP ecosystems within them to recuperate. This ecosystem has relatively low potential for harbouring known rare and endangered plant species

### **Management recommendations**

- 1) Prescribed burning for this ecosystem complex is recommended. A spring surface fire burn will be safest and most effective. The area should be monitored yearly and a subsequent follow-up burn to clean up slash, and kill back expected aspen suckering be undertaken as required.
- 2) The moderate cattle grazing, along with timely spring controlled burning as required will help to maintain a healthy turf and at the same time knock back and possibly arrest aspen suckering.
- 3) Post burn monitoring of both grazing and forest ingress should be followed in order maintain rangeland health and grassland stability.

## **Management Recommendations for the Medium Priority Area**

### **Background**

Similar to the high priority area, the medium priority area is concentrated in the eastern half of the study area. It is a complex of ecosystems with a good naturalness rating indicating either light to moderate grazing and/or moderate grassland forest invasion of grassland areas. This area is a complex of dry aspen forest and submesic/subxeric grasslands on gently to steeply sloping fairly deep soils. The open mature aspen forests feature a grass, forb, shrub community dominated by pinegrass. These aspen forests occur on moderately to steeply sloping warm aspect slopes, underlain by relatively deep sandy loam glaciofluvial deposits and some steep gravelly loam textured morainal deposits. Cattle grazing in these forests is mostly light

Three grassland types occur in this complex: Pinegrass – Kinnikinnik (PK), Needlegrass-Timber oatgrass (NT) and Bluegrass-Slender wheatgrass (BW/82). The BW occurrence is limited and very minute in area. Because of this, it has not been mapped and is not a significant management factor in this area.

The NT grassland is a very stable long lived edaphic climax grassland occurring on gently sloping to level very coarse gravelly mostly subxeric glacio-fluvial benches. It is bordered by dry pine and aspen forests but forest encroachment is quite slow. Because of the high proportion of relatively less palatable oatgrass and needlegrasses it is a less favoured grazing area than the PP grassland in the high priority area. Controlled burning is not an issue at this time for maintenance of this grassland. Because of its accessibility, this grassland is, at present, being moderately to lightly grazed by domestic livestock.

The PK grassland is similar to that of the NT ecosystem in that it is subxeric to submesic grassland dominated by a grass species less preferred by cattle. The dominant grass, in this instance, is pinegrass. It differs from the NT in most other aspects. It occurs on mostly submesic moderately to steeply sloping southerly aspects. Some of the slopes are inaccessible to cattle. It generally occurs on more fine textured, sandy loam, glaciofluvial deposits and sometimes on loamy morainal deposits. It appears to be a long lived seral stage of neighbouring dry forest ecosystems (the SBSd-03 and 05). This grassland is experiencing moderate invasion from neighbouring forests and remnants of charcoal can be found within this grassland type. Current cattle grazing pressure on this ecosystem is moderate to light.

### **Management recommendations**

- 1) The PK ecosystem will benefit from periodic prescribed burns to keep forest encroachment at bay. Areas of this ecosystem could undergo a spring surface fire burn in conjunction with the neighbouring high priority area, however fire periodicity will not have to be as frequent to maintain this ecosystem as with the PP seral grassland.
- 2) The PK ecosystem is probably a snapshot of the outcome of burning the neighbouring submesic-subxeric aspen forests. A prescribed spring surface burn of these aspen forests, with follow-up burning to deal with aspen suckering, would convert them to a PK grassland seral stage. Grass forb forage is relatively abundant in these open mature aspen forests but would be augmented by opening up the canopy more. There is a good possibility that opening the stands, accompanied by a light grazing regime would result in an increase in cover values of pumpelly brome, slender wheatgrass. These two native grass species are valuable cattle forage species.
- 3) The NT edaphic climax ecosystem does not require prescribed burning at this time to maintain itself. Because areas of this grassland occur intimately complexed with the other two medium priority ecosystems, it could be burned with them with little ill effect. Grazing intensity is a more key issue with the NT, at this time. This grassland currently has a naturalness rating of good based on its present light to moderate grazing regime. This ecosystem still does contain significant covers of slender wheatgrass which will draw cattle to this ecosystem. A heavy grazing regime will compromise the natural integrity of this ecosystem. Pristine to excellent examples of this relatively rare ecosystem have virtually disappeared. Of all the forest or non-forest ecosystems, so far discussed, this ecosystem has the best chance of harbouring red or blue listed species including *Senecio plattensis* and *Polemonium elegans*. By augmenting and maintaining grazing opportunities in the neighbouring PK and open dry aspen forests, grazing pressure can be eased on NT grasslands
- 4) Post-burn monitoring of both grazing and forest ingress should be followed in order maintain rangeland health and grassland stability.

## **Management recommendations for the low priority area**

### **Background**

The low priority management area includes the whole western half of the Euchiniko Sidehills Proposed Sensitive Area as well as significant portions of the eastern half. The low priority ecosystems include all ecosystems with a pristine or excellent naturalness rating as well as small limited areas including some ecosystems with a good naturalness rating which are remote from and/or are not accessible to cattle grazing due to steep slopes. This group of ecosystems includes conifer and mixed conifer deciduous stands that have a lower probability of being successfully converted to grassland by prescribed burning. In addition, the existence of these forests contribute significantly to the biodiversity of the whole study area as well as providing important habitat features not supplied by non-forested ecosystems. The forested ecosystems also include two blue listed ecosystems: SBSdk-02, Pl-Juniper-Ricegrass and the SBSdk-06, Twinberry-Coltsfoot.

Non-vegetated ecosystems including rock (RO) and pond ecosystems as well as a sedge fen (FE) ecosystem have been awarded high naturalness values and are included in the low management priority grouping.

Two non-forested grasslands: Pasture sage—Slender wheatgrass (PW) and the Needlegrass-Slender wheatgrass (NW) as well as a shrub dominated ecosystem, the Saskatoon-Slender wheatgrass (SW), all with high naturalness ratings, belong to the low management priority category.

Small areas of PK occurring in the west end of the study area with a good naturalness rating have been included with this group since they are well removed from areas that are used for cattle grazing.

### **Management recommendations**

- 1) Monitor forested areas with significant mature lodgepole pine component for pine bark beetle attack. If intervention is deemed necessary, then these sites could be appraised for their potential as grazing areas and for possible maintenance in a seral grassland stage.
- 2) PW NW and SW are all rare, mostly xeric to subxeric, ecosystems occurring on very steep southerly shallow to bedrock sites. They are almost entirely inaccessible to cattle grazing because of steep slopes. These ecosystems are all very long lived edaphic climax ecosystems with little or no current forest ingress. Elements of these ecosystems occur in close proximity to grasslands and aspen forests in the high to medium priority areas and could be included in a controlled burn, along with the surrounding sites, with no adverse effects. These ecosystems have been a refugia for grassland plant communities for many hundreds if not thousands of years stretching back to the end of the last glaciation and have a high potential for harbouring rare or endangered plant species. Avoid, if possible, any disturbance to these sites.
- 3) Even though the PW, NW and SW ecosystems are presently healthy and stable they should be monitored for forest ingress along with the NT and PK grassland ecosystem units.

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## APPENDIX 1

### Euchiniko Sidehills naturalness rating map

APPENDIX 2

Euchiniko Sidehills  
Rangeland Management Recommendation Map