THE ROUGH FESCUE DOMINATED COMMUNITY
TYPES IN THE FOOTHILLS OF
NORTH-CENTRAL
ALBERTA

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THE ROUGH FESCUE DOMINATED COMMUNITY TYPES IN THE FOOTHILLS OF NORTH-CENTRAL ALBERTA

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METHODS

All of the data from the rough fescue dominated communities identified by Willoughby (2001), Willoughby (1997) and Willoughby et al. (2001) in the Upper Foothills, Subalpine and Montane subregions of Alberta were classified using both cluster analysis (EAS) and ordination (PC-ORD). The data included plots from near the Ya-Ha-Pa, Isadore, Harrison, Bow, Forty Mile, Flat, Upper Clearwater Forest Land (the Zone), Ribbon Falls, Panther Creek and Wilson

Lawson (1969) and Hill (1993) tell that the third rough fescue zone was dominated by Northern rough fescue, but there appears to be extensive overlap between this species and southern rough fescue, particularly in the southern part of the zone west of Rocky Mts. House and Sundre.

ABSTRACT

The fescue grasslands of Alberta are an important grazing resource for both wildlife and domestic livestock. These grasslands are also found in some of the most ecological diverse areas of the province. Looman (1982) described three zones of rough fescue in Alberta, characterized by a different species. In the Northern rough fescue zone, north of 51° N latitude in the foothills of North-central Alberta three undisturbed rough fescue dominated types have been described. These include the Rough fescue-Hairy wildrye dominated community which is found on dry, well-drained sites. On moister sites with deep snow accumulation bog birch will invade to form the Bog birch/Rough fescue/Bearberry dominated community type. In contrast, on moist, rich sites tufted hairgrass co-dominates with rough fescue to form the Rough fescue-Tufted hairgrass dominated community type. This paper will describe and examine the successional relationships of these community types in the presence and absence of disturbance.

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INTRODUCTION

Looman (1982) and Hill (1995) recognized three zones of rough fescue in Alberta (Figure 1) each characterized by a different species (Pavlick and Looman 1984). The largest zone (I) included the Foothills and Central Parkland (Strong and Thompson 1995) of east-central Alberta and is dominated by Plains Rough fescue (*Festuca hallii*). The second zone (II) is dominated by Foothills Rough fescue (*F. campestris*) and includes the Foothills fescue, Montane and Subalpine subregions of southwestern Alberta and the Cypress Hills. The third zone (III) is dominated by Northern rough fescue (*F. altaica*) and extends north of 50° N latitude along the foothills and mountains of north-central Alberta and includes the Upper Foothills, Subalpine and Montane subregions.

Classification of the Rough fescue dominated communities have been made by Willoughby et al. (2001) for the Foothills rough fescue zone, but only a limited classification is available for the Northern rough fescue¹ zone. Particularly, it is not clear how the rough fescue grasslands are related between the Upper Foothills, Montane and Subalpine subregions.

The rough fescue grasslands of North-Central Alberta are important locally for grazing by livestock and wildlife. Morgantini and Russell (1983) found that rough fescue made up over 69% of the elk winter diet in the Ya Ha Tinda area. These grasslands are also important in maintaining the local biodiversity. Despite the importance of these grasslands there is little understanding of their ecology. Willoughby (2001) and Willoughby (1999) have identified a Rough fescue-Hairy wildrye, Rough fescue-Tufted Hairgrass and Bog birch/Rough fescue/Bearberry dominated communities in the Upper Foothills and Subalpine subregions within this zone, but no attempt has been made at examining the relationship between these community types across the various subregions. In this paper the data from the rough fescue dominated communities north of 51° N latitude located within the Upper Foothills, Subalpine and Montane subregions were combined in order to determine the similarity and successional relationships of these types.

METHODS

All of the data from the Rough fescue dominated communities identified by Willoughby (2001), Willoughby (1999) and Willoughby et al. (2001) in the Upper Foothills, Subalpine and Montane subregions of Alberta were classified using both cluster analysis (SAS) and ordination (PC-ORD). The data included plots done near the Ya Ha Tinda ranch, Harrison flats, Forty Mile Flats (Upper Clearwater Forest Land Use Zone), Ribbon Flats, Panther Corners and Wilson

¹Looman (1969) and Hill (1995) felt that the third rough fescue zone was dominated by Northern rough fescue, but there appears to be extensive overlap between this species and Foothills rough fescue, particularly in the southern part of the zone west of Rocky Mtn. House and Sundre.

Creek range allotment. These data also included rangeland reference area data from, McCue Creek, Yara Creek, Harold Creek, Upper James River, Seven mile burn, Elk Creek and Eagles Nest Cabin (Willmore Wilderness Park) (Weerstra and Willoughby 1998). The reference area data included grazed and ungrazed transects with over 30 years of data from a number of the sites. The initial classification was complicated by the fact that a number of the transects represented grazing and fire disclimax community types. In order to gain a better understanding of the ecology of these sites in the absence of disturbance only the undisturbed transects were reordinated and classified. This left 64 transects which included the inside ungrazed transects from 1981 to 2000 at the Upper James (UJR) and McCue Creek (MC) reference areas, from 1991 to 2000 at the Harold Creek (HC) reference area, from 1998 to 2000 at Eagles Nest cabin (EN) and Wilson Creek allotment (WCT01). The inside and outside transects from 1979 to 1985 at Yara Creek (YC), from 1991 to 2000 at Elk Creek (EC) and the unburned transects at Seven Mile Burn (SMB). Data from Ribbon Creek Flats (RF) prior to brush clearing (MacCallum and Yakimchuk 1992), Panther Corners (PANT)(AGRA 1998) and Forty Mile Flats (FM) were also included in the analysis.

Both the Ya Ha Tinda (YE,YW) and Harrison flats (H) areas of the province have extensive areas of rough fescue grassland that support large herds of elk. In an effort to determine how these disturbed grasslands were ecologically related to the other undisturbed rough fescue dominated community types the Ya Ha Tinda and Harrison transects were reordinated with the summarized species lists of the undisturbed Rough fescue-Hairy wildrye (HWR), Bog birch/Rough fescue/Bearberry (B EGL) and Rough fescue-Tufted hairgrass (TUFT) community types.

Figure 1. Rough fescue dominated zones in Alberta. Adapted from Looman (1982)

Ordination (DECORANA)(Gauch 1982) and cluster analysis (SAS) multivariant techniques combine the sites based on the similarity of species composition. The groupings from cluster analysis were overlain on the site ordination. Soil moisture, nutrients, drainage, elevation and slope data were collected in the procedure outlined in the Ecological Land Survey Site Description Manual (1994). These data were correlated with the ordination axes using PC-ORD in an effort to determine which environmental variables accounted for the most variation in the species-stand table. These data were presented in a species-environment biplot.

Rangeland reference area sites were selected from within range allotments on areas that represented primary range. Originally sites thought to be in poor range condition were selected. These sites were usually represented by open grasslands on south-facing slopes, benchlands and terraces. The reference sites were not located near salt or within 100-ft. (30-m) of a fence. The preferred distance from a water source was greater than 1000-ft. (300-m) but less than 1-mi. (1.6-km). Each reference site consisted of a fenced exclosure and a 100-ft (33-m) transect inside and outside the exclosure. The outside transect was situated 25-ft (8-m) or greater from the edge of the exclosure. At 3-in. (7-cm) intervals, the basal frequency of the plant species were recorded using Parker's loop (Parker 1954). In 1981, the canopy cover of the plant species was also recorded (at 6-ft. (1.8-m) intervals) using a 20x50 cm Daubenmire frame. Presently, the transects are being recorded every three years. All the basal frequency data prior to 1981 was converted to canopy cover using regression analysis.

Transect data from non-rangeland reference area sites were collected in order to develop management plans for the various range allotments. These data were collected using the methodology outlined by Dale et al. (2001).

RESULTS

Species composition

The ordination and cluster analysis of the undisturbed rough fescue dominated communities in zone 3 is outlined in Figures 2 and 3. The first two axes in the ordination accounted for 49% and 16% of the variation in the species stand table, respectively (Figure 2). There is a distinct grouping of the transects done at Yara Creek (YC), McCue Creek (MC), Upper James River (UJR), majority of the Panther Corner transects and Forty Mile flats. These transects are dominated by rough fescue, hairy wildrye and slender wheatgrass and represent the Rough fescue-Hairy wildrye community type. The transects located at Harold Creek (HC), Eagles Nest (EN) and Wilson Creek (WCT) were all dominated by rough fescue and tufted hairgrass and they grouped together to form the the Rough fescue-Tufted hairgrass dominated community type.

The final grouping was all of the transects that were dominated by bog birch, rough fescue and bearberry. These included the Seven Mile Burn, Ribbon Flats, Elk Creek and a number of transects located within Panther Corners. Both the cluster analysis (Figure 3) and ordination (Figure 2) indicated that the Rough fescue-Tufted hairgrass and Rough fescue-Hairy wildrye dominated community types were much more similar than the transects dominated by rough fescue, bearberry and bog birch. Indeed, cluster analysis indicated that the Rough fescue-Tufted hairgrass transects grouped together within the larger Rough fescue/Hairy wildrye dominated group (Figure 3).

Figure 2. Ordination of undisturbed Rough fescue dominated plots in Zone III.

Figure 3. Cluster analysis of undisturbed Rough fescue plots in Zone III.

(descces), monkshood (acondel), veiny meadow rue (thalven), thick-spiked and long-bracted sedges (caremac, careatr), tall lungwort (mertpan), dock (rumeace), arctic rush (juncbal) were found at the top of axis 2. These species were correlated with higher moisture and were found on somewhat richer sites. Species that were common to all three types tended to be found in the middle of the ordination rough fescue (festsca), hairy wildrye (elyminn), slender wheatgrass (agrotra), old man's whiskers (geumtri), strawberry (fragvir), mountain dandelion (agosgla), blunt sedge (careobt), flax (linulew), shooting star (dodecon) and fireweed (epilang).

Table 1 outlines the differences in species composition between the various community types. All three community types were dominated by rough fescue which was not significantly different between the types. The Rough fescue-Hairy wildrye community type had a significantly higher cover of shrubby cinquefoil and slender wheatgrass than the Rough fescue-Tufted hairgrass or Rough fescue/Bearberry/Bog birch community types. In contrast, the Rough fescue-Tufted hairgrass had a significantly higher cover of tufted hairgrass than the other community types and the Rough fescue/Bearberry/Bog birch community had the highest cover of bog birch, bearberry and oatgrass species (Parry and California) (Table 1).

Table 2 outlines the physical characteristics of each plant community type. The soils of each community type are very similar ranging from Orthic Eutric and Melanic Brunisols on the Rough fescue-Hairy wildrye and Bog birch/Rough fescue/Bearberry communities to Cumulic and Orthic Regosols on the Rough fescue-Tufted hairgrass community. All of the communities have fluvial and lacustrine parent materials and their textures range from loamy at the surface to Clay loams and Silty Clay Loams at depth. The pH ranges from 5-8 and the depth of the Ah horizon averages from 3-10 cm for all community types. The Rough fescue-Tufted hairgrass or Bog birch/Rough fescue/Bearberry community is slightly moister ranging from mesic to subhygric, than the Rough fescue-Hairy wildrye community type which has a submesic to mesic moisture regime. The Rough fescue-Tufted hairgrass community also has slightly poorer drainage and higher nutrients than the other community types with gleying at depth at one site.

Table 1. Canopy cover of selected species in each of the three rough fescue dominated community types in Zone III.

Species	Rough fescue- Hairy wildrye	Rough fescue- Tufted hairgrass	Rough fescue Bearberry/ Bog birch
Shrubs			
SHRUBBY CINQUEFOIL (<i>Potentilla fruticosa</i>)	4a*	1b	1b
BOG BIRCH (<i>Betula glandulosa</i>)	0b	Tb	32a
Forbs			
OLD MAN'S WHISKERS (<i>Geum triflorum</i>)	9a	2c	6b
COMMON YARROW (<i>Achillea millefolium</i>)	3a	3a	3a
GRACEFUL CINQUEFOIL (<i>Potentilla gracilis</i>)	4a	2a	Ta
AMERICAN VETCH (<i>Vicia americana</i>)	3a	Ta	1a
MOUNTAIN DANDELION (<i>Agoseris glauca</i>)	1a	Ta	1a
VEINY MEADOW RUE (<i>Thalictrum venulosum</i>)	1b	4a	1b
TALL LARKSPUR (<i>Delphinium glaucum</i>)	2a	Tb	1b
BEARBERRY (<i>Arctostaphylos uva-ursi</i>)	1b	Tb	10a
Grasses			
NORTHERN AND FOOTHILLS ROUGH FESCUE (<i>Festuca altaica</i> , <i>F. campestris</i>)	21a	17a	28a
HAIRY WILDRYE (<i>Elymus innovatus</i>)	5a	5a	4a
SLENDER WHEATGRASS (<i>Agropyron trachycaulum</i>)	7a	3b	3b
SEDGE SPECIES (<i>Carex obtusata</i> , <i>C. siccata</i> <i>C. praeegracilis</i> , <i>C. atosquama</i>)	9a	9a	9a
TUFTED HAIRGRASS (<i>Deschampsia cespitosa</i>)	Tb	12a	Tb
JUNEGRASS (<i>Koeleria macrantha</i>)	1a	Tb	1b
CALIFORNIA OATGRASS (<i>Danthonia californica</i>)	Tb	0b	3a
PARRY OATGRASS (<i>Danthonia parryi</i>)	Tb	0b	2a
BOG SEDGE (<i>Kobresia myosuroides</i>)	1a	0a	Ta

*Means with the same letter within a row are not significantly different according to an LSMEANS test at the 0.05 level .

Table 2. Site characteristics of the three undisturbed rough fescue dominated community types in Zone III.

Site characteristics	Rough fescue -Hairy wildrye	Rough fescue -Tufted hairgrass	Rough fescue/ Bearberry/ Bog birch
Soil (subgroup)	O. Melanic Brunisol ¹ O.Eutric Brunisol ⁷ O. Humic Regosol ²	Cumulic Regosol ⁵ Orthic Regosol ⁵	O.Eutric Brunisol ¹⁰
Parent material	Fluvial, Colluvial apron, Glacial fluvial	Fluvial, Glacial Fluvial	Lacustrine, over glacial till
Surface Texture	L	L	L
Effective texture	CL, SiL, SiCL, SiC	CL, SiCL	CL, SiL, SiC
pH	5-8	5-6.5	5-8
Ah thickness (average)	2-27(10)	2-4(3)	2-5(4)
Humus form	Mor, Mull	Mor	Mull, Mor
Depth to Gleying	None	None, 60cm	None
Moisture	Submesic, Mesic	Mesic, Subhygric	Mesic, Subhygric
Nutrient	Mesotrophic, Permesotrophic	Mesotrophic, Permesotrophic	Mesotrophic
Drainage	Well	Moderately well, Well	Well
Elevation (m)	1470-2150	1370-1737	1300-1981
Aspect	Level, South	North, East, South	Level, South
Slope (%)	0-22(9)	2-3(2)	1-2(1)
Number of Soil Pits	10	2	4

1 Indicates percentage of soil pits with this soil subgroup (ie 1=10%)

Ya Ha Tinda, Harrison Flats

The ordination of the Ya Ha Tinda (YE, YW) and Harrison flats (H) transects with the summarized undisturbed rough fescue community types is outlined in Figure 5.

Figure 5. Ordination of Ya Ha Tinda and Harrison flats transects with the summarized undisturbed rough fescue dominated community types in Zone III

The first two axes accounted for 51% and 11% of the variation in the species-stand table respectively. The ordination indicates that the Ya Ha Tinda and Harrison flat grasslands have a closer affinity with the Rough fescue-Hairy wildrye (HWR) community than either the Rough fescue-Tufted hairgrass (TUFT) or Bog birch/Rough fescue/Bearberry (BEGL) dominated

community types.

There is a distinct grouping of the Ya Ha Tinda plots into two community types. The first type was described on grasslands east of Scalp Creek (YE). These transects were dominated by shrubby cinquefoil, rough fescue or sedge, junegrass, fringed brome, old man's whiskers and early yellow locoweed and represent the Rough fescue-Sedge-Junegrass community type (Willoughby et al. 2001). This community type was the most extensive grassland community described in the Ya Ha Tinda area. The other community type was described west of Scalp Creek near the Ya Ha Tinda ranch buildings. The transects (YW) in this community were dominated by shrubby cinquefoil, sedge, junegrass, Kentucky bluegrass, showy locoweed and cut leaved anemone. These transects represented a Sedge-Junegrass community type.

In contrast the Harrison flats transects were the most similar to the summarized Rough fescue-Hairy wildrye (HWR) community and were dominated by shrubby cinquefoil, rough fescue, sedge, junegrass, old man's whiskers and early yellow locoweed. The dominant species on the Harrison transects are very similar to the dominant species at the Ya Ha Tinda, but the cover of rough fescue averaged 35% at Harrison flats in comparison to only 10% at the Ya Ha Tinda (Appendix 1).

DISCUSSION

The rough fescue dominated grasslands follow the creeks and river valleys throughout the foothills of the Rocky Mountains north of Calgary to Willmore Wilderness park near Grande Cache. The topography of the area consists of both mountains and foothills. Closed-canopy coniferous forest dominates the area with potential climax species on modal sites being white and black spruce with lodgepole pine as an early successional species (Strong 1992). The valley bottoms have predominant willow and bog birch cover with pockets of open grassland. The south facing slopes are also covered by grassland.

The rough fescue dominated grasslands are generally found on mesic to subhygric, well drained sites within these valley bottoms and on lower slope positions of south facing slopes. On moister and richer sites tufted hairgrass and graceful sedge often replaces rough fescue as the dominate species in the community. On steep dry south facing slopes hairy wildrye, junegrass, sedge species and fringed sage tend to dominate (Willoughby 2001).

Soil moisture and nutrients appear to account for most of the variation within the ordination of the undisturbed rough fescue dominated community types. Moisture is a major limiting factor limiting the distribution of plants (Krebs 1978). In this study it appears there was a definite species response to a moisture and nutrient regime gradient. Species characteristic of moist, medium rich sites included bog birch, willow, graceful sedge, and alpine bistort. These species were indicative of the Bog birch/Rough fescue/Bearberry community type. Species characteristic of moist, rich sites included tufted hairgrass, long-bracted sedge, monkshood, tall lungwort and dock. These species were characteristic of the Rough fescue-Tufted hairgrass community type. In contrast species characteristic of dry, well drained, medium to rich sites included bog sedge, fringed sage, shrubby cinquefoil and locoweeds. These species were characteristic of the Rough fescue-Hairy wildrye community type.

Plant community ecology

Bog birch/Rough fescue/Bearberry

de Groot (1998) found that bog birch tended to prefer moist, acidic, nutrient poor organic soils which were well drained. Anderson (1975) also found that bog birch is very sensitive to extremely cold winter temperatures, but can survive temperatures to as low as -27°C if sufficient snowfall occurs. The presence of bog birch on these rough fescue dominated grasslands may indicate sites which have deeper snow accumulations, which insulate bog birch from the extreme winter conditions. The deeper snow accumulations would also increase soil moisture in the spring further favouring bog birch growth. The surface of this community is well drained and dries out quickly in the summer favouring the growth of rough fescue, junegrass, bearberry, Parry oatgrass and California oatgrass plant species.

Repeated fire (every few years) reduces bog birch canopy cover and above ground biomass, but has only a minimal effect on bog birch mortality (de Groot 1998, Bork et al. 1996). Bork et al. also found that burning bog birch three times in 9 years controlled shrub growth and increased forage production by over 40% compared to the unburned control. The increase in bog birch cover in the absence of fire is evident from the pictures taken at the Elk Creek rangeland reference area from 1968 to 2000 (Photo 1).

Rough fescue-Hairy wildrye

The Rough fescue-Hairy wildrye dominated community is found on submesic to mesic, well drained sites. This community can also be found on south facing slopes in lower slope positions where some moisture accumulates (Willoughby 2000). In the absence of grazing and fire it appears this community type will eventually succeed to conifer forest (Willoughby 2000), but the time frame for complete tree invasion appears to be greater than 60 years. Willoughby also found that increased grazing pressure by domestic livestock leads to a decline in rough fescue and other native species and allows species like Kentucky bluegrass and dandelion to dominate the site to form a Kentucky bluegrass-Sedge dominated community type.

Initial analysis of the Ya Ha Tinda ranch and Harrison flats rough fescue dominated grasslands indicated that these grasslands were very different from the other undisturbed rough fescue dominated types. Work by Looman (1969), found that these grasslands supported a large elk herd during the winter when they remained snow free. It would appear that this heavy dormant season grazing has altered the community structure so that these grasslands do not resemble the other undisturbed or grazed Rough fescue-Hairy wildrye community types. Bailey et al. (1988) found that heavy dormant season grazing lowered plains rough fescue cover and allowed species like junegrass, sedge, slender wheatgrass, fringed sage and pussytoes to increase in the Aspen parkland. They also found that forage production was significantly lower under

1968

2000

Photo 1: The lack of fire has allowed bog birch cover to increase on both the grazed and ungrazed transects at the Elk Creek rangeland reference area from 1968 to 2000.

heavy dormant season grazing compared to the ungrazed control. They concluded that heavy dormant season grazing was having the same impact on the community as a light June grazing treatment. It would appear that the heavy grazing by wildlife during the winter is having a similar affect on the majority of the Ya Ha Tinda grasslands.

The other Ya Ha Tinda grassland community type (Sedge-Junegrass) that was described by Willoughby et al. (2001) was found in an area where the Ya Ha Tinda ranch feeds hay to horses during the winter. The horses also graze this area early in the spring. This grazing pressure has allowed Kentucky bluegrass to invade onto this community type and it would appear that this community type is succeeding to a community that is similar to a number of the grazed transects of the rangeland reference areas to the east of the ranch in the Red Deer river valley (Willoughby 2000).

It would appear that the grasslands of the Ya Ha Tinda represent grazing disclimax community types. If protected from grazing these grasslands would likely succeed to a community type that is similar to the undisturbed Rough fescue-Hairy wildrye dominated type.

Rough fescue-Tufted hairgrass

The Rough fescue-Tufted hairgrass community is found on moderately well drained, subhygric, rich sites. This community type appears to represent the transition between the drier Rough fescue-Hairy wildrye community and the moister and richer Tufted hairgrass-Sedge dominated community type (Willoughby 2001). Willoughby (1998) found a 25% increase in shrub cover in only 25 years on the Tufted hairgrass-Sedge community type, but this community type is rarely shrub covered. Photos taken at the Harold Creek rangeland reference area in 1963 and again in 2000 show little shrub expansion in over 30 years of no disturbance (Photo 2). Lane et al. (2001), have found that there has only been an 18% increase in shrub cover on this community type in Willmore Wilderness Park in over 40 years. Presently it is not clear why shrub expansion is slower in this community type.

Continued grazing pressure causes rough fescue to decline and initially tufted hairgrass and sedge increase in cover. However, continued grazing pressure causes a further decline in all native species and the site will become dominated by Kentucky bluegrass, dandelion and clover species (Willoughby 2001). In Willmore where there is little seed source for Kentucky bluegrass and these heavily grazed Rough fescue-Tufted hairgrass types are often dominated by alpine timothy, slender wheatgrass, sedge and tufted hairgrass. Many of the sites have also been invaded by tall buttercup.

SUMMARY

The fescue grasslands of Alberta represent some of the most ecologically diverse areas of the province. Historically, the desired plant community of these grasslands was one that maximized beef production, which has led to a decline in condition of many of these grassland communities. In recent years there has been a movement towards more sustainable use of our natural resources. The scope of sustainability has shifted from being defined by economic assesment to include broader sustainability of ecological functions and patterns (Lee and

1963

1994

Photo 2: In over 30 years of protection from grazing and fire there has been little shrub expansion at the Harold Creek rangeland reference area. However, shrub expansion has continued on the moister sites in the background

Hanus 1998). Today society desires the conservation of native plant communities. In North-central Alberta these rough fescue dominated grasslands are important locally for both wildlife and domestic livestock. They also contribute to the local biodiversity of the area. Despite their importance there is only limited understanding of their ecology. This paper describes and presents a classification of the rough fescue dominated community types of the foothills of North-central Alberta. This classification recognizes three rough fescue dominated community types and outlines the successional relationships of each type. Hopefully, this classification can be used to ensure the conservation of these native grasslands.

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APPENDIX ONE:

**VEGETATION SPECIES LISTS FOR THE VARIOUS PLANT COMMUNITY TYPES:
INCLUDES YA HA TINDA AND HARRISON FLATS**

Group name: Rough fescue-Hairy wildrye

		Avg		Avg		Plots																							
LAYER	n	% P	MC	MC81I		MC85I		MC88I		MC91I		MC94I		MC97I		MC99I		MC00I		YC79I		YC790		YC81I		YC810		YC85I	
				Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg
5	SPECIES																												
	1	POTEFRU	77.1	03.8	01																								
	2	ARCTUVA	11.4	00.6																									
	3	ROSAACI	08.6	00.1																									
6	4	POPUTRE	05.7	00.0																									
	5	POTEGRA	05.7	00.0																									
	6	POTEGRA	97.1	03.5	05																								
	7	ACHIMIL	94.3	03.3	07																								
	8	GALIBOR	91.4	02.4	04																								
	9	GEUMTRI	88.6	09.0	30																								
	10	VICIANE	88.6	02.5	00																								
	11	AGOSGLA	82.9	01.2	00																								
	12	CERAARV	80.0	00.5																									
	13	CAMPROT	77.1	00.7																									
	14	DELPGLA	74.3	02.1	02																								
	15	TARAOFF	65.7	01.3	01																								
	16	THALVEN	62.9	01.4	06																								
	17	FRAGVIR	57.1	01.8	00																								
	18	DODECON	48.6	00.4																									
	19	ASTELAE	45.7	00.7																									
20	EPILANG	40.0	01.4																										
21	ANEMMUL	40.0	00.4	01																									
22	ASTRALP	40.0	00.4																										
23	LINULEW	34.3	00.4	00																									
24	ALLICER	34.3	00.2																										
25	ZIZIAPT	34.3	00.1	00																									
26	SMILSTE	31.4	00.6																										
27	OXYTSE	28.6	00.9																										
28	HEDYBOR	25.7	00.8																										
29	MERTPAN	22.9	01.7																										
30	ANTEPAR	22.9	00.3																										
31	STELLON	22.9	00.2																										
32	RUMEAGE	22.9	00.1																										
33	VIOLADU	20.0	00.2																										
34	SOLIMIS	17.1	00.2																										
35	LATHOCH	17.1	00.1																										
36	OXYTMON	14.3	00.4																										
37	ARTEFRI	14.3	00.2																										
38	MYOSALP	14.3	00.1																										
39	GENTAMA	14.3	00.1																								</		

Group name: Rough fescue-Hairy wildrye

[illegible]

(Continued)

Group name: Rough fescue-Hairy wildrye

		Plots																										
LAYER	n	SPECIES	Avg	Avg	MC81I		MC88I		MC91I		MC94I		MC97I		MC99I		MC00I		YC79I		YC790		YC81I		YC810		YC85I	
			%	P	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg
6	81	POTEARG	02.9	00.0																								
	82	ZIGAELE	02.9	00.0																								
	83	ARNICHA	02.9	00.0																								
	84	GEUMMAC	02.9	00.0																								
	85	POLEACU	02.9	00.0																								
	86	RHINMIN	02.9	00.0																								
	87	FESTSCA	0100	20.7	15		37	01	47	15	29	13	14	04	07	10	09	18	17	14	15	11	12	08	19	10	01	01
	88	AGROTRA	91.4	06.8	04		01	01																				
	89	ELYMINN	68.6	04.6																								
	90	KOELMAC	62.9	01.3				01																				
7	91	BROMCIL	45.7	01.5			03		00		04		04		00		13	07	07	07	06		00		01		01	01
	92	JUNCBAL	42.9	00.8			00										01	00	01	02	02		00		01		00	00
	93	POA PRA	42.9	00.5	02													05	11	11	02	24	00				02	
	94	CAREOBT	37.1	03.5			02		18		09		06		10		00											
	95	BROMINE	31.4	00.8			01										27											
	96	HELIHOO	31.4	00.2																								
	97	CAREPRE	25.7	01.9																								
	98	POA SPP	17.1	00.3																								
	99	CARESP	14.3	01.0																								
	100	CAREXER	14.3	01.0																								
	101	FESTSAX	14.3	00.2																								
	102	PHLEPRA	11.4	00.0																								
	103	FESTIDA	08.6	00.2																								
	104	CAREATR	08.6	00.2																								
	105	BROMPUM	08.6	00.2																								
	106	KOBRMYO	05.7	01.4																								
	107	CARESP2	05.7	00.3																								
	108	DANTPAR	05.7	00.3																								
	109	AGROSMI	05.7	00.2																								
	110	HIERODO	05.7	00.1																								
	111	DANTCAL	05.7	00.1																								
	112	FESTOVI	05.7	00.0																								
	113	DESCCES	05.7	00.0																								
	114	CARESP1	02.9	00.3																								
	115	CARESC	02.9	00.3																								
	116	STIPVIR	02.9	00.3																								
	117	CAREFIL	02.9	00.1																								
	118	AGROELY	02.9	00.0																								
	119	POA ALP	02.9	00.0																								
	120	AGROSTO	02.9	00.0																								

(Continued)

Group name: Rough fescue-Hairy wildrye

			Plots																											
LAYER	n	SPECIES	Avg	Avg	MC81I		MC85I		MC88I		MC91I		MC94I		MC97I		MC99I		MC00I		YC79I		YC790		YC81I		YC810		YC85I	
			% P	MC	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg
8	121	OXYTSE	02.9	00.0																										
	122	MOSSPP	02.9	00.0																										
	123	ANEMMUL	02.9	00.0																										
	124	AGOSGLA	02.9	00.0																										
	125	DODECON	02.9	00.0																										

(Continued)

02

Group name: Rough fescue-Hairy wildrye

[illegible]

(Continued)

Group name: Rough fescue-Hairy wildrye

		Plots																												
LAYER	n	YC850		UJR81I		UJR85I		UJR88I		UJR91I		UJR94I		UJR97I		UJR00I		PANT02		PANT13		PANT03		PANT43		PANT50		PANT26		
		Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	
6	SPECIES																													
	ERIGSP																													
	41																													
	RUMEOC																													
	42																													
	SOLIMUL			00		00													01											
	43					00																								
	HEUCRIC																													
	44																													
	GAILARI																													
	45																													
	ARTEUD																													
	46																													
	47																													
	48																													
	49																													
	50																													
	51																													
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	77																													
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	79																													
	80																													

Group name: Rough fescue-Hairy wildrye

			Plots																										
LAYER	n	SPECIES	YC850	UJR81I		UJR85I		UJR88I		UJR91I		UJR94I		UJR97I		UJR00I		PANT02		PANT13		PANT03		PANT43		PANT50		PANT26	
			Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	
6	81	POTEARG																											
	82	ZIGAELE							00																				
	83	ARNICHA							00																				
	84	GEUMMAC																											
	85	POLEACU			00																								
	86	RHINMIN			00																								
	87	FESTSCA	02		23		04		42		58		22		21		20		10		34		18		11		18		19
	88	AGROTRA	01		16		01		02		12		03		06		04		02		11		13		01		06		00
	89	ELYMINN	04		02		05		14		09		12		07		11		06		01		17		01		03		00
	90	KOELMAC			00				00						05		08		01		00		00		01		00		00
	91	BROMCIL	00								00		04		02		03		03				00						
	92	JUNCBAL			00		00		01		06		03		03		02		05				00						
	93	POA PRA			00		00		00		12		00		00		02						00						
	94	CAREOBT	02																										
	95	BROMINE							00																				
	96	HELIHOO																											
	97	CAREPRE							04				02		07		06		00		02		01		03		01		04
	98	POA SPP			00		01												00		00								
	99	CARESP																	00		00								
	100	CAREXER																											
	101	FESTSAX																											
	102	PHLEPRA																											
	103	FESTIDA			00		00		00																				
	104	CAREATR																											
	105	BROMPUM																											
	106	KOBRMYO																											
	107	CARESP2																											
	108	DANTPAR																											
	109	AGROSMI																											
	110	HIERODO																											
	111	DANTCAL																											
	112	FESTOVI																											
	113	DESCCES							00																				
	114	CARESP1																											
	115	CARESIC																											
	116	STIPVIR																											
	117	CAREFIL																											
	118	AGROELY																											
	119	POA ALP							01																				
	120	AGROSTO							00																				

(Continued)

RESOURCE INVENTORY, EDMONTON ALBERTA

Group name: Rough fescue-Hairy wildrye

		Plots																												
		YC850		UJR81I		UJR85I		UJR88I		UJR91I		UJR94I		UJR97I		UJR00I		PANT02		PANT13		PANT03		PANT43		PANT50		PANT26		
		Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	
LAYER	n	SPECIES																												
8	121	OXYTSE																												
	122	MOSSPP																												
	123	ANEMMUL																												
	124	AGOSGLA																												
	125	DODECON																												

(Continued)

Group name: Rough fescue-Hairy wildrye

LAYER n		Plots												FM02	
		PANT22		PANT40		PANT44		PANT59		PANT06		PANT20		FM03	
		Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg
5	SPECIES	03													
1	POTEFU	03	31	04	08	10						02		00	
2	ARCTUA		03									04		11	
3	ROSAACI	00										01			
4	POPUTRE														
5	POTEGRA														
6	POTEGRA	01	04	00	03	00	00	00	00	00	01	01		00	
7	ACHIMIL	00	03	00	00	00	00	00	00	00	01	00		01	
8	GALIBOR	00	00	00	00						00	00		15	
9	GEUMTRI	03	03	00	08						00	00		02	
10	VICIAME	03	04	01							00	01		00	
11	AGOSGLA	01		00	01	04		01		01	00	00		00	
12	CERAARV	02	00	01	00	00	00	00	00	00	00	00		00	
13	CAMPROT	03	02	01	00	00	00	00	00	00	01	00		00	
14	DELPGLA													00	
15	TARAOFF		00		00	00				00				00	
16	THALVEN											07			
17	FRAGVIR	00	03		03	00				00		00			
18	DODECON	00	00	00		00									
19	ASTELAE		00	01		01									
20	EPILANG	00	00	01	00	01		00	00	02		00		01	
21	ANEMMUL	02	00	01	00	01		00	00	01				02	
22	ASTRALP													00	
23	LINULEW		00	00		00				00					
24	ALLICER		00	00		00									
25	ZIZIAPT														
26	SMILSTE	00		00		00									
27	OXYTSE	03	01	07	05	01		00	01			00		11	
28	HEDYBOR	02	00	00	06	00						11			
29	MERTPAN													05	
30	ANTEPAR		02	00	00	00									
31	STELLON														
32	RUMEACE														
33	VIOLADU														
34	SOLIMIS	00	00		01							03			
35	LATHOCH		00												
36	OXYTMON														
37	ARTEFRI	00												07	
38	MYOSALP	00	00	01	00							00			
39	GENTAMA			00											
40	ASTECIL													01	

Group name: Rough fescue-Hairy wildrye

LAYER n		Plots											
		PANT22		PANT40		PANT44		PANT59		PANT06		PANT20	
		Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg
6	SPECIES												
41	ERIGSP		00	01				01					00
42	RUMEOCC											01	01
43	SOLIMUL									00			
44	HEUCRIC												
45	GAILARI							01					
46	ARTELUD	00						03					
47	ASTEALP												
48	PENSPRO												
49	TRIFREP												
50	BOTRLUN												
51	HEDYALP												
52	GERARIC												
53	ANDRSEP	00		00								00	
54	SENEPAU												
55	ARABHIR												
56	ASTECON												
57	GEUMALE												
58	POTEANS												
59	HEDYSUL												
60	ANDROCHA			02				02					
61	PLANIAJ												
62	CASTFLA							01					
63	POTEDIV												
64	HETEVIL												
65	POTEPEN												
66	SONCARV											01	
67	HIERCYN												
68	ANTELAN												
69	HIERUMB												
70	VALEDIO												
71	MINUGUT												
72	POLEPUL												
73	GENTGLA											00	
74	POTEFRU												
75	RANUCAR												
76	SISYMON												
77	ANAPMAR												
78	OXYTSPL											00	
79	GENTCAL												
80	PENSCON												

(Continued)

Group name: Rough fescue-Hairy wildrye

		Plots															
		PANT22		PANT40		PANT44		PANT59		PANT06		PANT20		FM03		FM02	
		Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg
6	LAYER																
	n																
	SPECIES																
	81	POTEARG															
	82	ZIGAELE															
	83	ARNICHA															
7	84	GEUMMAC															
	85	POLEACU															
	86	RHINMIN															
	87	FESTSCA	14	21	10		15	28									
	88	AGOTRA	00	03			08	02								43	
	89	ELYMINN	02	01	05		00	03								12	
	90	KOELMAC	04	00	01		00	00								02	
	91	BROMCIL						02								00	
	92	JUNGBAL															
	93	POA PRA															
	94	CAREOBT															
	95	BROMINE	02		00		04						07				
	96	HELIHOO	01	00	01		00	00									02
	97	CAREPRE															
98	POA SPP		00			02	03					03					
99	CARESP																
100	CAREXER	05	11	08		02											
101	FESTSAX	02															
102	PHLEPRA																
103	FESTIDA																
104	CAREATR																
105	BROMPUM																
106	KOBRMYO																
107	CARESP2																
108	DANTPAR	02															
109	AGROSMI																
110	HIERODO																
111	DANTCAL																
112	FESTOVI																
113	DESCCES																
114	CARESP1																
115	CARESIC																
116	STIPVIR																
117	CAREFIL																
118	AGROELY																
119	POA ALP																
120	AGROSTO																

Group name: Rough fescue-Hairy wildrye

[illegible]

Group name: Bog birch/R.fescue/Bearberry

			Plots																											
LAYER	n	SPECIES	Avg	Avg	EC910		EC911		EC940		EC941		EC971		EC970		EC001		EC000		SMB085		SMB086		SMB100		SMB000		SCAM90	
			% P	MC	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg
5	1	BETUGLA	0100	32.2	41																									
	2	POTEFRU	66.7	01.4																										
	3	SALIMYR	38.1	00.5																										
	4	SALISPP	14.3	00.7																										
	5	SALIBEB	09.5	02.0																										
	6	ARCTUVA	04.8	00.5																										
	7	SALIATH	04.8	00.0																										
	8	FRAGVIR	0100	02.6	00																									
	9	ACHIMIL	0100	02.6	02																									
	10	GEUMTRI	90.5	05.5	01																									
	11	GALIBOR	81.0	01.1	00																									
	12	AGOSGLA	76.2	00.7	02																									
	13	ARCTUVA	71.4	09.1	07																									
	14	ASTRALP	71.4	01.6	01																									
	15	PENSPRO	66.7	01.3	03																									
	16	ZIZIAPT	66.7	00.5	00																									
	17	VICIAME	61.9	01.3																										
	18	EPILANG	57.1	01.7																										
	19	ASTELAE	57.1	01.5																										
	20	TARAOFF	57.1	00.4	02																									
	21	CERAARV	52.4	00.3	00																									
	22	SOLIMUL	42.9	01.0																										
	23	THALVEN	42.9	00.7																										
	24	DELPGLA	42.9	00.7																										
	25	LATHOCH	42.9	00.6																										
	26	POTEHIP	38.1	01.0	02																									
	27	VIOLADU	38.1	00.5	02																									
	28	POTEGRA	38.1	00.4																										
	29	POLYVIV	38.1	00.3	00																									
	30	VACCACAE	33.3	01.8	08																									
	31	CREPRUN	33.3	01.1																										
	32	ANTEPAR	33.3	00.2	00																									
	33	CAMPROT	33.3	00.1																										
	34	HEDYALP	28.6	01.0																										
	35	SOLIMIS	28.6	00.5	05																									
	36	RUBUARC	28.6	00.4	01																									
	37	OXYTSE	28.6	00.3																										
	38	GENTAMA	28.6	00.1	00																									
	39	HEDYBOR	19.0	00.4																										
	40	STELLON	19.0	00.3																										

Group name: Bog birch/R.fescue/Bearberry

		Plots																												
		Avg		Avg	EC910		EC911		EC940		EC941		EC971		EC970		EC001		EC000		SMB085		SMB086		SMB100		SMB000		SCAM90	
		% P	MC	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	
6	LAYER																													
	n																													
	41	SPECIES	14.3	00.3																										
	42	OXYTSP	14.3	00.1																										
	43	POTEDIV	14.3	00.1																										
	44	ASTECIL	09.5	00.4																										
	45	SENECAN	09.5	00.1																										
	46	VALESIT	09.5	00.1																										
	47	SENEPAU	09.5	00.1																										
	48	MOEHLAT	09.5	00.0																										
	49	ANDRCHA	09.5	00.0																										
	50	CIRSUND	09.5	00.0																										
	51	RUMEOCC	09.5	00.0																										
	52	SMILSTE	09.5	00.0																										
	53	ANEMLIT	09.5	00.0																										
	54	MERTPAN	04.8	00.3																										
	55	SAXITRI	04.8	00.2																										
56	PENSCON	04.8	00.2																											
57	VALEDIO	04.8	00.0																											
58	ANTEANA	04.8	00.0																											
59	DODECON	04.8	00.0																											
60	GENTCAL	04.8	00.0																											
61	HEUCRIC	04.8	00.0																											
62	SENEINT	04.8	00.0																											
63	ANTELAN	04.8	00.0																											
64	CIRSVUL	04.8	00.0																											
65	RANURHO	04.8	00.0																											
66	VIOLCAN	04.8	00.0																											
67	FESTSCA	0100	27.8	29																										
68	CAREPRE	66.7	06.7	16																										
69	ELYMINN	66.7	04.1	00																										
70	DANTCAL	66.7	02.7	05																										
71	AGROTRA	61.9	02.6																											
72	DANTPAR	38.1	01.8																											
73	FESTSAX	33.3	01.0																											
74	AGROELY	23.8	03.1																											
75	BROMCIL	23.8	01.3																											
76	CARESCIC	23.8	00.5	02																										
77	CARESPP	19.0	01.1																											
78	POA PRA	19.0	00.3																											
79	SCHIPUR	14.3	00.7																											
80	KOBRMYO	14.3	00.4																											
	BROMINE	14.3	00.4																											

Group name: Bog birch/R. fescue/Bearberry

		Plots																											
		Avg		EC910		EC91I		EC940		EC94I		EC971		EC970		EC00I		EC000		SMB085		SMB086		SMB100		SMB000		SCAM90	
		% P	MC	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg
LAYER 7	SPECIES																												
	81	DESCES	14.3	00.2	02																								
	82	FESTIDA	09.5	00.5	08																								
	83	LUZUMUL	09.5	00.1																									
	84	POA INT	09.5	00.1																									
	85	JUNCBAL	09.5	00.0																									
	86	PHLECOM	09.5	00.0																									
	87	BROMPUM	09.5	00.0																									
	88	MUHLCOUS	09.5	00.0																									
	89	KOELMAC	04.8	00.4																									
LAYER 8	90	CAREOBT	04.8	00.3																									
	91	CAREATR	04.8	00.1																									
	92	CAREAUR	04.8	00.0																									
	93	POA COM	04.8	00.0	00																								
	94	FESTRUB	04.8	00.0																									
	95	CALAMON	04.8	00.0																									
	96	AGROMER	04.8	00.0																									
	97	AGROSCA	04.8	00.0																									
	98	POA ALP	04.8	00.0																									
	99	CALACAN	04.8	00.0																									
LAYER 9	100	MOSSPP	66.7	27.2	30																								
	101	PELTGAN	19.0	00.3																									
	102	CLADSPP	09.5	00.0																									

(Continued)

Group name: Bog birch/R. fescue/Bearberry

		Plots															
		UNBU90		PANT31		PANT37		PANT57		PANT47		RF01		RF02		RF03	
		Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg
LAYER 5	n	SPECIES															
	1	BETUGLA	70		39		24		62		30		33		20		40
	2	POTEFRU	03	02	06						04				01		00
	3	SALIMYR															
	4	SALISPP	02	07							16		01		06		
LAYER 6	5	SALIBEB							26								
	6	ARCTUVA		10													
	7	SALIATH															
	8	FRAGVIR	04	01	02			00		04			05		09		08
	9	ACHIMIL	03	01	03			00		02			05		02		01
	10	GEUMTRI	05	06	07			01							05		07
	11	GALIBOR	02	00				00		00			00		00		01
	12	AGOSGLA															
	13	ARCTUVA															
	14	ASTRALP															
	15	PENSPRO															
	16	ZIZIAPT	02				05		00		02		01		03		01
	17	VICIAME	02	02	08			01			02		01		01		00
	18	EPILANG	04	03	00			02			06		02		08		03
	19	ASTELAE									05				03		07
	20	TARAOFF															
	21	CERAARV		00				00		00		00		00		00	
	22	SOLIMUL															
	23	THALVEN	02					00									
	24	DELPGLA															
	25	LATHOCH															
	26	POTEHIP															
	27	VIOladu															
	28	POTEGRA															
	29	POLYVIV										01					
	30	VACCACAE															
	31	CREPRUN															
	32	ANTEPAR															
	33	CAMPROT															
	34	HEDYALP															
	35	SOLIMIS															
	36	RUBUARC															
	37	OXYTSE															
	38	GENTAMA															
	39	HEDYBOR															
	40	STELLON															

Group name: Bog birch/R.fescue/Bearberry

		Plots																	
		UNBU90		PANT31		PANT37		PANT57		PANT47		RF01		RF02		RF03			
		Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg		
LAYER 6	n	SPECIES																	
		OXYTSPL																	
		POTEDIV																	
		ASTECIL																	
		SENECAN																	
		VALESIT																	
		SENEPAU																	
		MOEHLAT		01															
		ANDRCHA																	
		CIRSUND																	
		RUMECC				00													
		SMILSTE																	
		ANEMLIT																	
		MERTPAN																	
		SAXITRI																	
		PENSOON																	
VALEDIO																	03		
ANTEANA				00															
DODECON																			
GENTCAL						00													
HEUCRIC																			
SENEINT														00					
ANTELAN																			
CIRSVUL																			
RANURHO																			
VIOLCAN																			
FESTSCA	27		22		31		10									27	37		
CAREPRE																20	13		
ELYMINN	05		02		00		07									16	09		
DANTCAL	12															00	00		
AGROTRA					04											15	08		
DANTPAR																			
FESTSAX														01		00	00		
AGROELY	22																		
BROWCIL																			
CARESIC																			
CARESPP																			
POA PRA			12		06		01												
SCHIPUR																			
KOBRMYO	07		00		01												02		
BROMINE																			

(Continued)

Group name: Boq birch/R. fescue/Bearberry

		Plots															
		UNBU90		PANT31		PANT37		PANT57		PANT47		RF01		RF02		RF03	
		Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg
LAYER 7	n																
	SPECIES																
	81	DESCES															
	82	FESTIDA															
	83	LUZUMUL															
	84	POA INT															
	85	JUNGBAL															
	86	PHLECOM															
	87	BROMPUM															
	88	MUHLCUS															
	89	KOELMAC															
	90	CAREOBT															
	91	CAREATR															
	92	CAREAUR															
	93	POA COM															
	94	FESTRUB															
	95	CALAMON															
	96	AGROMER															
	97	AGROSCA															
	98	POA ALP															
89	99	CALACAN															
	100	MOSSPP															
	101	PELTCAN															
	102	CLADSPP															

Group name: Rough fescue-Tufted hairgrass

		Plots																			
		AVG		AVG	MC	HC91I		HC94I		HC97I		HC00I		EN98		EN99		EN00		WCT01	
		%	P		Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	
LAYER	n	SPECIES																			
5 6	1	POTEFRU	37.5	00.8							01									03	03
	2	BETUGLA	12.5	00.4							05		03		03		04		03	01	01
	3	ACHIMIL	0100	04.1	02		08		01		00		01		02		01		01	00	00
	4	GALIBOR	0100	01.6	01		02		00		00		00		00		01		01	00	00
	5	RUMEACE	0100	00.7	01		00		06		02		04		04		00		04	02	02
	6	THALVEN	87.5	04.3	05		07		04		01		03		03		00		00	03	03
	7	POTEGRA	87.5	02.1			02		04		01		00		00		00		00		
	8	CERAARV	87.5	00.7	01		02		00		01		00		01		00		00		
	9	FRAGVIR	87.5	00.7	00		00		01		18		00		03		09		05		01
	10	PENSRO	75.0	06.6	06		11		00		00		00		00		03		02		
	11	MERTPAN	62.5	01.3					00		00		00		00		00		00		
	12	CAMPROT	62.5	00.2			00		00		00		00		00		00		00		00
	13	GEUMTRI	50.0	01.5	01		03		00		05		02		00		00		00		00
	14	DELPGLA	50.0	00.3					00		00		00		00		00		00		00
	15	ARNICHA	50.0	00.2	00				00		00		00		00		00		00		00
	16	VICIAME	50.0	00.1	00		00		00		00		00		00		00		00		00
	17	AGOSGLA	50.0	00.1	00		00		04		02				02		02		04		00
	18	ASTELAE	37.5	02.2	04		09								00		00		00		00
	19	ACONDEL	37.5	01.1											01		00		00		00
	20	EPILANG	37.5	00.2											00		00		00		00
	21	ZIZIAPT	37.5	00.2											00		00		00		00
	22	SOLIMUL	37.5	00.2	00										00		00		00		00
	23	ASTRALP	37.5	00.1											00		00		00		00
	24	TARAOFF	37.5	00.1											00		00		00		00
	25	RUBUARC	37.5	00.1											00		00		00		00
	26	PENSCON	25.0	03.8											02		00		03		00
	27	POTEARG	25.0	00.9	04		02				00		00				00		02		00
	28	POTEDIV	25.0	00.5																	
	29	POTEHIP	25.0	00.4																	
	30	DRABSP	25.0	00.2															01		
	31	VIOLADU	25.0	00.0	00		00														
	32	ASTECIL	12.5	00.3																	
	33	CIRSUND	12.5	00.1																	
	34	STELLON	12.5	00.1			01								02		00				
	35	SENEPAU	12.5	00.1																	
	36	VALESIT	12.5	00.1																	
	37	GEUMALE	12.5	00.1			00														
	38	ARCTUVA	12.5	00.1																	
	39	ANTELAN	12.5	00.0			00														00
	40	PEDIGRO	12.5	00.0																	00

(Continued)

Group name: Rough fescue-Tufted hairgrass

Plots																				
	Avg	Avg	Plots																	
			HC91I		HC94I		HC97I		HC00I		EN98		EN99		EN00		WCT01			
	% P	MC	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg		
6	LAYER n	SPECIES																		
		41	12.5	00.0																
		42	12.5	00.0																
		43	12.5	00.0																
		44	12.5	00.0																
7	45	FESTSA	0100	16.7	28			08	07		21		20		12		16		19	
	46	DESCES	0100	15.2	23			16	13		12		14		12		10		19	
	47	CAREPRE	0100	07.6	02			06	03		04		08		10		04		22	
	48	AGROTRA	75.0	03.3	06			06	04		05				01				02	
	49	JUNCBAL	75.0	00.5	00			00	00		00						00	01		
8	50	ELYMINN	50.0	05.1									11		10		10		08	
	51	FESTSAX	50.0	00.5							00		01		01		00			
	52	SCHIPUR	37.5	01.0							02		00		00		06			
	53	POA COM	37.5	00.6	01					01							00		03	
	54	DANTCAL	25.0	00.4																
9	55	POA PRA	25.0	00.3				01			00									
	56	HIERODO	25.0	00.2	01			00												
	57	CARESP	25.0	00.2				00					01							
	58	BROMCIL	25.0	00.1						00		00				00		00		
	59	PHLECOM	25.0	00.1													00			
	60	TRISSPI	25.0	00.1													00			
	61	BROMPUM	12.5	00.5																
	62	CAREMAC	12.5	00.3						02										
	63	CAREATR	12.5	00.2																
	64	CALARUB	12.5	00.2						01										
	65	KOELMAC	12.5	00.1																
	66	POA ALP	12.5	00.1													00			
	67	FESTBRA	12.5	00.0				00												
	68	MOSSPP	12.5	02.8																
	69	CLADSP	37.5	00.4												01		01		
	70	PELTAN	25.0	00.3									01		01					
	71	CETRNV	12.5	00.1														00		

Group name: Harrison flats

LAYER		Avg		Plots												H395	
		% P	MC	H183		H187		H195		H383		H387		H395		Cv	Vg
				Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg				
5	SPECIES																
1	POTEFRU	0100	09.9	10		05		02		15		13		13			
2	JUNIHOR	16.7	00.8	05													
3	SALISPP	16.7	00.0														
4	THALVEN	0100	02.9	00		05		01		00		05		01			
5	GALIBOR	0100	01.2	01		01		00		04		02		00			
6	OXYTMON	83.3	08.7	10		26		06		07		07		01			
7	ACHIMIL	83.3	03.9	00		10				01		07		03			
8	HEDYALP	83.3	02.6	00				00		00		13		00			
9	ERIGCAE	83.3	01.4	00		05		02		00		01		04			
10	AGOSGLA	83.3	01.3	00		00		00		01		01		01			
11	CERAARV	83.3	01.0	00		01				20		17		05			
12	GEUMTRI	66.7	07.3	00						07		04					
13	DELPGLA	66.7	02.2					00		00							
14	CAMPROT	66.7	01.5	00		05		02		00		00					
15	STELLON	66.7	00.6	01		12		01		00							
16	ANTEPAR	50.0	03.2	06						00							
17	TARAOFF	50.0	00.6			00				00		02					
18	CREPRUN	50.0	00.5	00				00		00				02			
19	ANEMMUL	50.0	00.5					02		00				00			
20	POTEDIV	50.0	00.2							00		00		00			
21	SISYMON	50.0	00.2					00		00		00		00			
22	POTEGRA	50.0	00.1					00		00		00		00			
23	ANDRCHA	33.3	02.1			10		02									
24	SELADEN	33.3	01.7	05		05											
25	ARTEFRI	33.3	01.0	05		01											
26	RUMEACE	33.3	00.5														
27	LINULEW	33.3	00.4							00		02		02			
28	ZIZIAPT	33.3	00.2					00		00		00		00			
29	GENTAMA	33.3	00.1	00				00		00		00		00			
30	ASTRALP	33.3	00.1							00		00		00			
31	ARNIFUL	16.7	01.1							06							
32	ARCTUVA	16.7	00.8	05								06					
33	POTEPEN	16.7	00.8														
34	ASTECIL	16.7	00.5									03					
35	ASTROU	16.7	00.2														
36	SOLIMUL	16.7	00.2							01							
37	RANUCYM	16.7	00.1			01											
38	DODEPUL	16.7	00.1														
39	OXYTDEF	16.7	00.0							00				00			
40	VIOLADU	16.7	00.0											00			

Group name: Harrison flats

[illegible]

Group name: Ya Ha Tinda (R.fescue-H.wildrye

			Plots															
			Avg		YE03		YE05		YE06		YE02		YE07		YE01		YE09	
			% P	MC	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg
LAYER 5	n	SPECIES																
		POTEFRU	85.7	02.0	00		02		01		02		01				04	
		POPUTRE	28.6	00.2			00										00	
		BETUGLA	14.3	00.6	04													
		SALIGLA	14.3	00.2	01													
6	5	ROSAACI	14.3	00.1													01	
	6	CAMPROT	0100	01.1	00		03		00		00		02				01	
	7	OXYTMON	85.7	07.8	01		03				01		12				07	
	8	HEDYALP	85.7	02.8	00		05		09		00		03				00	
	9	AGOSGLA	85.7	01.7	01		01				01		02				00	
	10	GALIBOR	85.7	01.3	00		03				02		01				00	
	11	ANTEPAR	85.7	01.0	00		00		00		01		03				00	
	12	ASTELAE	85.7	00.7	00		01		00		01		00				00	
	13	GEUMTRI	71.4	09.0	03		14		20		12		12					
	14	ANEMMUL	71.4	01.5			01		01		02		01				03	
7	15	ANDRCHA	71.4	00.8	00		00		00		02		02					
	16	POTEGRA	71.4	00.5	01		01		00		00		01				00	
	17	ACHIMIL	57.1	02.4	00		08		04		02		02				02	
	18	THALOCC	57.1	00.9					02		00		01				00	
	19	ARTEFRI	57.1	00.4					00		01		01				00	
	20	CERAARV	57.1	00.2	00				00		00		00				00	
	21	ANTELAN	42.9	02.2					09				03				02	
	22	VICIAME	42.9	01.5	05		04										00	
	23	OXYTSPL	42.9	01.1			00		00		06							
	24	ASTECIL	42.9	00.5			01		01		01		00					
	25	VIOLADU	42.9	00.1					00		00		00					01
	26	COMAUMB	28.6	00.7			03											
	27	LINULEW	28.6	00.4					00									02
	28	SOLIMUL	28.6	00.4			00				02							
	29	THALVEN	28.6	00.4	01		01											
	30	FRAGVIR	28.6	00.4	01		01											
31	DELPGLA	28.6	00.3	01														
32	ZIZIAPT	28.6	00.1	00				01										
33	EPILANG	28.6	00.1	00		00												
34	SMILSTE	14.3	00.4					02										
35	ANTEROS	14.3	00.3	02														
36	OXYTSER	14.3	00.3															
37	LATHOCH	14.3	00.1															
38	HIERUMB	14.3	00.0	00		00												
39	PENSPRO	14.3	00.0	00														
40	POTEDIV	14.3	00.0					00										

Group name: Ya Ha Tinda (R.fescue-H.wildrye

			Plots											
LAYER	n	SPECIES	Avg	Avg	YE03		YE05		YE06		YE07		YE09	
					Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg	Cv	Vg
7	41	FESTSCA	0100	09.6	07		09	08			18		04	07
	42	CAREFIL	0100	07.6	01	14	14	06	10	05	05	10	05	05
	43	KOELMAC	0100	04.4	01	03	03	06	02	03	03	10	03	10
	44	AGRODAS	0100	04.0	10	07	01	01	00	02	02	03	03	03
	45	BROMCIL	85.7	07.2	02	08	17	17	10	11	11	00	00	00
	46	TRISSPI	85.7	01.9	02	03	02	02	03	00	01	02	02	00
	47	POA SEC	71.4	01.9	01	08		08			00	00	02	00
	48	CAREPRE	42.9	02.7	07	11		00			04			
	49	ELYMINN	42.9	02.3	10	00								
	50	POA NER	28.6	02.4	00				16					
	51	JUNCBAL	28.6	00.7				00		04				
	52	FESTSAX	28.6	00.4	00								02	
	53	BROMINE	14.3	00.5	03			03						
	54	KOBRSIM	14.3	00.5										
	55	CAREPRA	14.3	00.2					01					
	56	HIERODO	14.3	00.0		00								

Group name: Ya Ha Tinda (Sedge-Junegrass)

			Avg		Plots					
			Avg	P	YWO1		YWO3			
					MC	Cv	Vg	Cv	Vg	
LAYER	n	SPECIES								
5	1	POTEFRU	0100	07.6	09			05		
	2	OXYTSPL	0100	03.2	06			00		
	3	ANEMMUL	0100	03.1	02			03		
	4	GEUMTRI	0100	02.1	01			02		
	5	OXYTMON	0100	01.6	00			03		
	6	CAMPROT	0100	00.8	01			00		
	7	CERAARV	0100	00.5	00			00		
	8	AGOSGLA	0100	00.4	00			00		
	9	POTEDIV	0100	00.4	00			00		
	10	VALEDIO	50.0	01.9				03		
11	11	ARTEFRI	50.0	01.4	02					
	12	ZIGAELE	50.0	01.1	02					
	13	SMILRAC	50.0	00.8	01					
	14	ANDRCHA	50.0	00.8	01					
	15	THALVEN	50.0	00.6	01					
	16	VIOLADU	50.0	00.5	01					
	17	ANTEPAR	50.0	00.3				00		
	18	OXYTSER	50.0	00.1	00					
	19	POTEGRA	50.0	00.1	00					
	20	GALIBOR	50.0	00.1	00					
7	21	CARESPP	0100	06.3	06			06		
	22	KOELMAC	0100	05.2	06			04		
	23	POA PRA	0100	03.3	02			04		
	24	FESTSAX	0100	02.9	01			04		
	25	POA SEC	0100	01.3	01			01		
	26	ELYMINN	0100	00.9	00			01		
	27	AGROREP	50.0	01.0	02					
	28	BROMINE	50.0	00.6	01					
	29	DANTPAR	50.0	00.2				00		
	9	30	LICHEN	0100	06.8	01			12