IS OIL AND GAS DEVELOPMENT AND CONSERVATION OF ROUGH FESCUE PRAIRIE POSSIBLE?

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May 3, 2003 (revised Sep 20, 2004)

(Speaking notes for panel discussion at ANPC 2003 Conference - *In Celebration of Rough Fescue*)

Rough fescue grasslands need special consideration because of their rarity.

Alberta has the largest area of rough fescue grassland (particularly plains and foothills rough fescue dominated grasslands) in North America (Walter Willms, pers. comm..); BC is second (foothills and northern rough fescue) and probably the Yukon/Alaska third with northern rough fescue grassland; SK has less than 5% of its plains rough fescue grasslands left. Albertans are guardians of an important global heritage.

Less than 10% of southern Alberta currently is occupied by native rough fescue plant communities (11,000 km^2 of 112,000 km^2) (Adams, pers.comm)

- ~20% each of the Foothills Fescue, Foothills Parkland and Montane Natural Subregions
- ~15% of the Northern Fescue Natural Subregion
- ~5% each of the Central Parkland and Mixed Grass Natural Subregions

Of 1,686 grassland sites surveyed in the Central Parkland Natural Subregion , plains rough fescue occurred at 549 (32.7%) sites but only 211 (12.5%) had plains rough fescue communities (Holcroft-Weerstra, 2003). This level of information is not yet available for the Foothills Parkland and Montane Natural Subregions.

Six plain's rough fescue (*F.hallii*) community types occurring in Alberta are on the Plant Community Tracking List of ANHIC. They are ranked as S1 (<5 occurrence, very few remaining hectares) or S2 (6-20 occurrences, few remaining hectares). Two northern rough fescue (*F. altaica*) community types also are listed – as S1. Three foothills rough fescue community types have been listed as SU, S1 and S2S3. The Plant Community TL is developed based on a review of existing information by a group of experts in Alberta's native vegetation. Tracking lists are comprised of elements that are considered of high priority for conservation consideration because they are rare or special. (Allen, 2002)

Rough fescue plant communities are at more risk of conversion to non-native community types than other grassland types in Alberta.

Analysis of the frequency of four agronomic grasses and five noxious and nuisance weeds within several thousand range and vegetation survey plots within southern Alberta shows that native vegetation of the Foothills Fescue, Foothills Parkland and Montane Natural Subregions are more susceptible to invasion compared to native vegetation of the Mixed Grass, Dry Mixedgrass, Subalpine, and Lower and Upper Foothills Natural Subregions (Table 1 & 2). This probably is because soils generally are moister and more fertile in the Foothills Fescue, Foothills Parkland and Montane Natural Subregions and hence favour invasive agronomic grasses such as Kentucky bluegrass, timothy and awnless brome. Plots in riparian areas, which are characterized by moist, highly fertile soils, also have a high frequency of invasion of agronomic grasses. Similarly, Canada thistle, a noxious weed, is prevalent in plots of the Foothills Fescue, Foothills Parkland and Montane Natural Subregions, and in riparian areas throughout southern Alberta.

Of 1,686 grassland sites surveyed in the Central Parkland, 582 (34.5%) were dominantly non-native communities. Of the 211 sites with plains rough fescue communities, invasive non-native plants were found in 88 (42%) (Holcroft-Weerstra, 2003).

Non-native plant species invasion into native rough fescue grasslands of the Pekisko drainage has occurred within a corridor averaging about 50 metres wide along a road constructed to access a gas well in 1980 (Bradley et al., 2002). Crested wheat grass had >10% cover in vegetation along eight transects extending to a distance of 7 to 26 metres from the unreclaimed road centre. Patches were observed as far as 40 metres from the road.

A study in Glacier National Park found alien species invasion of ungrazed foothills rough fescue grasslands occurred up to 100 metres from both paved two-land roads and unimproved dirt roads, with further invasion anticipated over time (Tyser and Worley, 1992). *Phleum pretense* and *Poa pratensis* were particularly common among 15 alien species. Alien species richness declined away from roads. Management recommendations by these researchers are to avoid road-building in bunch grass communities and to intensively monitor and manage alien flora where roads already exist.

Rough fescue grasslands, once disturbed and/or invaded by non-native species, are less likely to be restored to native condition than other grassland types.

Currently there are no documented examples of successful restoration of rough fescue grassland following surface disturbances and/or invasion by non-native species. Small pipelines using “no strip” construction (trench) <30 cm are the exception. A summary of the results of some investigations into reclamation and restoration of rough fescue grasslands follows.

A restoration experiment in the grasslands of central Saskatchewan found that native plantings in the black soil zone (fescue prairie and parkland) were more seriously invaded by perennial weeds and experienced poorer seed production than native plantings in the mixedgrass and tall grass prairie regions (Clark, 1998). Clark concludes, after reviewing other research information about native prairie restoration that “conserving remaining rough fescue prairie rather than restoring it would have greater benefit”.

Range exclosure studies show that the potential for recovery of foothills rough fescue grasslands to a native community is quite limited once invaded by non-native species. For example, a study in southwest Alberta found that some rangeland reference area sites which were fenced from grazing before Kentucky bluegrass became established, recovered to grassland dominated by foothills rough fescue, Idaho fescue and Parry oatgrass in 20-30 years. In contrast, sites that had significant Kentucky bluegrass invasion prior to being fenced from grazing recovered to a grassland co-dominated by foothills rough fescue and Kentucky bluegrass Willoughby (1996).

Attempts to reduce the cover and competitiveness of agronomic grasses in foothills rough fescue grasslands using fire, mowing and glyphosate have met with poor results (Brown, 1977; Willms, pers. comm.).

A study in the Rumsey Block of central Alberta where an inventory of six gas well sites abandoned 5 to 13 years previously found fair to poor establishment of native species and invasion of non-native species used in reclamation into native fescue and mixedgrass prairie (Integrated Environments Ltd., 1991). Rough fescue in reclamation seed mixes had not become established. The author of the study also observed that cattle concentrated on the disturbed sites and that cattle management should be a key aspect of revegetation programs.

The site of a well drilled in 1980 in native foothills rough fescue grassland in the Pekisko drainage 22 years later supports a plant community whose herbaceous canopy cover still is dominated by two non-native grass species – awnless brome and Kentucky bluegrass – and prairie rose has established as a shrub layer (Bradley et al., 2002).

Results after five-years of monitoring reclamation along the Express Pipeline near the Cypress Hills are that recovery of plains rough fescue –mixed grass transition grasslands on dark brown soils is extremely slow (Axys Environmental Consulting Ltd. 2003). Stripped and unseeded sites had a vascular plant cover of only 34% after five years, the dominant species being Kentucky bluegrass and rough fescue having only 0.3% cover. No differences in natural recovery were observed between stripped widths of 8 metres, 16 metres and 24 metres. Sites seeded to plains rough fescue had none or only trace amounts of the species established after five years. On two sites where sod salvage was attempted results were more encouraging. Rough fescue density declined however suggesting that disturbance caused the community to shift to an earlier seral state wherein late seral species such as rough fescue were displaced by early seral species. Kentucky bluegrass invaded one site (AXYS Environmental Consulting Ltd. 2001). These findings are consistent with

those of Revel (1993) who transplanted rough fescue sod and reported a change in plant community structure away from dominance by deep-rooted bunch grasses (rough fescue) towards dominance by shallow-rooted rhizomatous grass species (bluegrasses, wheatgrasses) and forbs.

Avoiding surface disturbance of rough fescue grasslands and preventing invasion by non-native species is a necessary planning and management strategy if we are to have rough fescue grasslands in Alberta in 100 years.

Table 1: Percent Frequency[1] of Invasive Agronomic Grasses in Range Plots by Natural Subregion and in Riparian Plots in Southern Alberta.

Natural Subregion n=sample plots	Timothy	Awnless brome	Kentucky bluegrass	Crested Wheatgrass
Dry Mixed Grass[2] n=1628	0	T	5	2
Mixed Grass[2] n=724	2	6	32	4
Foothills Fescue[2] n=283	36	7	68	T
Foothills Parkland[2] n=410	73	21	75	T
Montane[3] n=1111	29	19	49	1
Subalpine[3] n=948	10	20	14	0
Lower Foothills[3] n=1202	9	3	20	0
Upper Foothills[3] n=641	15	12	49	1
Riparian Research Plots[4] N=488	15	25	36	0
Riparian Inventory Plots[5] n=872	47	78	87	17

[1] Frequency means species are present in plots but does not imply infestation levels of the species in the transect
[2] Native Prairie Data Base, Public Lands Division, Alberta Sustainable Resource Development, Lethbridge
[3] Ecological Site Information System, Alberta Sustainable Resource Development, Edmonton
[4] Data from Riparian Research Plots for the Grassland Natural Region, Cows and Fish Program
[5] Data from Riparian Health Assessment data base for the Grassland, Parkland and Boreal Natural Regions, Cows and Fish Program

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