Lynx Bench Range Reference Area

Purpose

Alberta Environment and Parks maintains a network of Reference Area Exclosures that are used by the Department as decision support tools for allocating forage on grazing dispositions based on ecological classification. The knowledge gained through these reference areas allows the Department to adjust allocations based on measureable changes in ecosystem function and forage production related to drought, climate, rangeland health, and site potential.

Many of the reference area sites are fenced exclosures that were established in the early 1950's. Each site has provided invaluable insight into ecological succession, the recovery of altered plant communities, the impacts of climate events, and shifts in climatic regime. These exclosures allow the Department to ensure that public lands are sustainably grazed and provide important ecological goods and services that benefit all Albertans.

The Montane Foothills Range Reference Area Program studies; 1) species composition, 2) range health, and 3) forage production at select reference areas annually. Each of the over 85 rangeland reference areas found within the Montane, Subalpine, Alpine, Foothills Parkland, Upper Foothills and Lower Foothills natural subregions have both ungrazed (inside) and grazed (outside) transects. Species composition, forage productivity, and biophysical conditions (moisture and nutrient regime) are used to measure the current plant community and track changes over time. These measures help us to understand the site potential from an ecological standpoint, allowing Government staff to determine and demonstrate sustainable use of forage resources, while maintaining ecological integrity, function, and health.

Lynx Bench Range Reference Area

Established: 2002
Location: SE 12-6-4-W5
Natural Subregion: Montane
Community: Snowberry / Kentucky bluegrass (C11)

Figure 1. Lynx Bench Range Reference Area (inside transect ungrazed by cattle).

Castle Allotment Historical Stocking Rates

The Lynx Bench Range Reference Area is found in the Castle River Allotment, an 83,214 hectare (205,628 acre) grazing allotment within the Rocky Mountain Forest Reserve. This allotment has been grazed by domestic livestock since the late 1800's. Grazing has been allocated for horses and cattle with major overutilization occurring in the 1930's and 40's when grazing regulations established by the Dominion of Canada required heavy livestock utilization rates to reduce the fire hazard in the Forest Reserve. This decision unfortunately led to detrimental changes in species composition that still influence plant community expression.

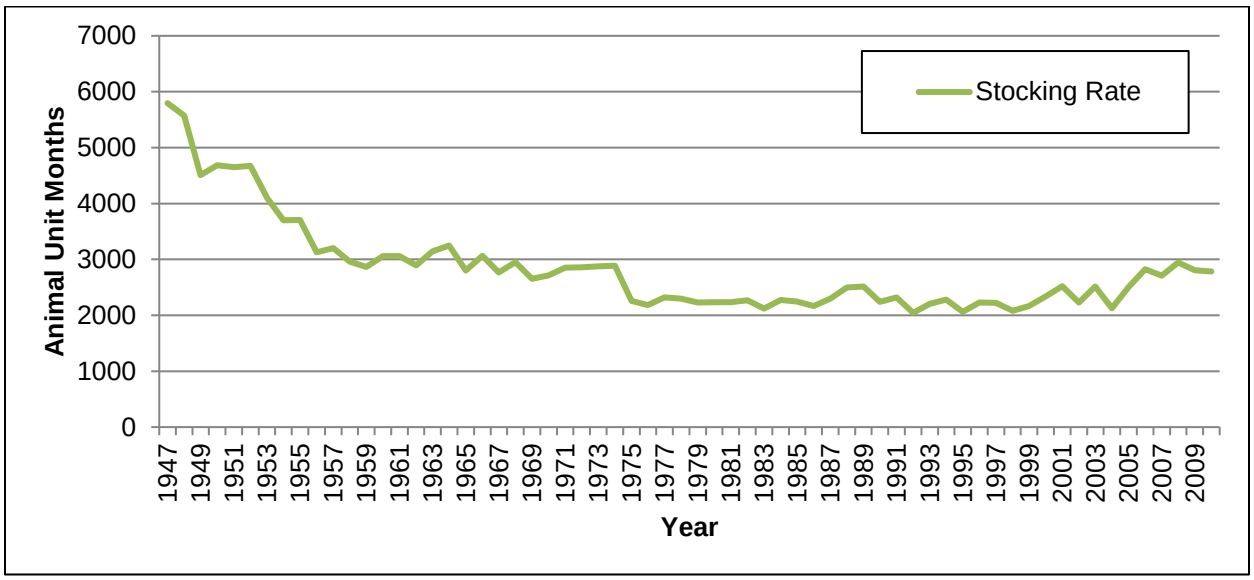

Figure 2. Stocking rates for the Castle Allotment from 1947-2010.

Stocking rate information dating back to 1947 illustrates a steady decline in the amount of animal unit months[1] (AUMs) stocked in the allotment (Figure 2) which is also partially due to increased forest cover and reduced primary range availability as a result of fire suppression in the Forest Reserve after significant fires that occurred in the 1930's. The slight increase in stocking rates seen in 2005 is exclusively due to adjustments to the Animal Unit Equivalent[2] value used to calculate AUMs for the allotment. The use of Animal Unit Equivalent values has allowed for a more accurate representation of livestock use even when the size of cattle and their forage requirements change.

Plant Community Analysis

The Lynx Bench site represents a snowberry dominated shrubland that was undergoing succession to a lodgepole pine dominated community before it was burned in 2001 by the Lost Creek wildfire. Interestingly, the area burned in the Castle Allotment by the Lost Creek fire was the only area not burned in the 1930's fire (GOA 2015). Based on multivariate analysis of ecological community data at Lynx Bench there is no trend towards different plant communities between the ungrazed and grazed transect - they express the same plant community, Snowberry / Kentucky bluegrass (C11) (Figure 3) as described in the Montane Natural Subregion Plant Community Guide (Willoughby et al. 2008).

[1] An Animal Unit Month is defined as the amount of forage (food) needed by an "animal unit" (AU) grazing for one month. The quantity of forage needed is based on the cow's metabolic weight, and the animal unit is defined as one mature 1,000 pound cow with or without calf at foot.

[2] In 2005 the Animal Unit Equivalent was legislatively defined as the forage requirement of an animal in relation to the standard animal unit of a 1,000 lb cow with or without calf at foot. Different classes of livestock have varying requirements depending on size and maturity, for example a 1,280 lb cow would have an Animal Unit Equivalent of 1.18.

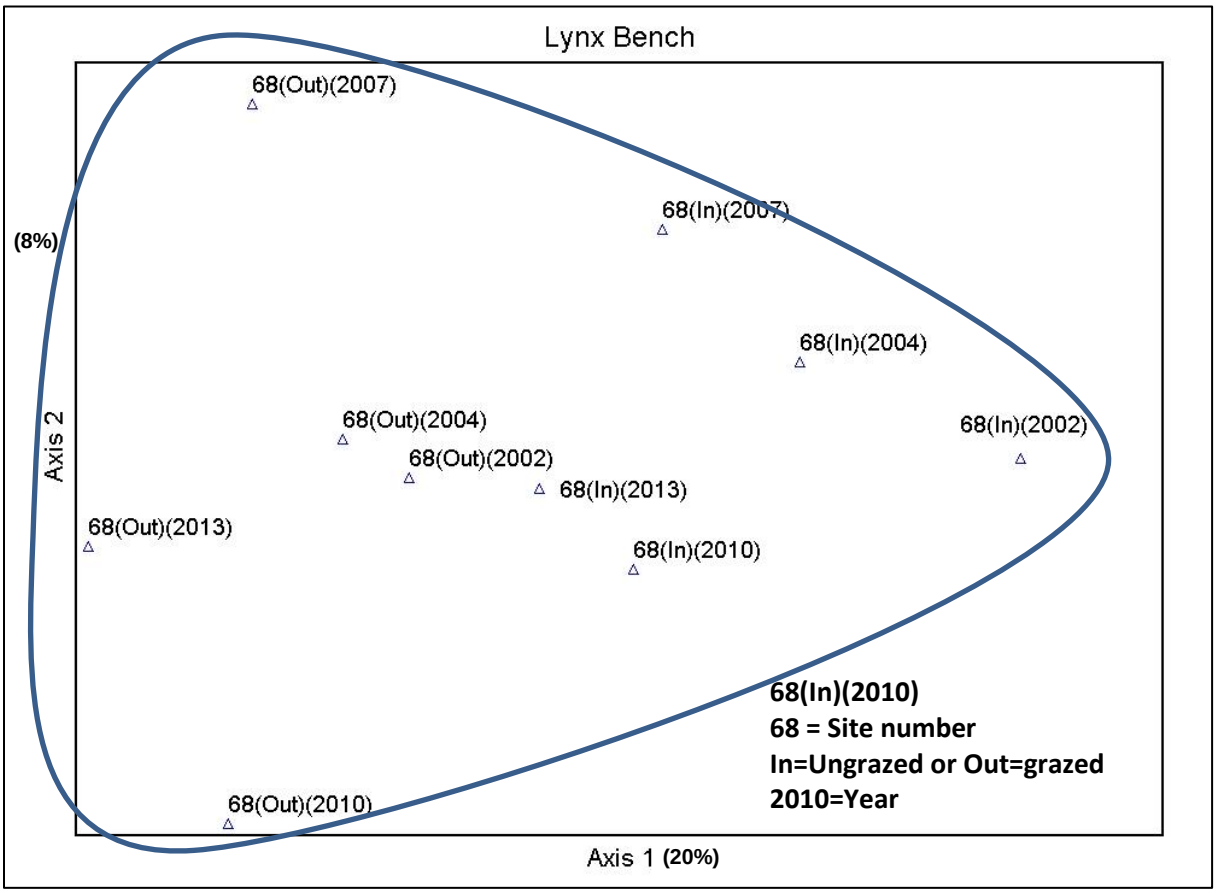

Figure 3. Lynx Bench multivariate plant community data analysis.

This data appears to suggest that livestock grazing is not having an impact on plant community species composition and structure.

Species Composition and Ecological Status

There is very little difference in plant species cover, diversity and ecological status between the ungrazed and grazed transects, as illustrated in Table 1. Ecological status refers to the functional diversity of plant species and the degree of similarity between the present plant community and the reference plant community – the term for the potential natural community that should occur on the site based primarily on environmental factors (Adams et al. 2010).

At the Lynx Bench reference area ecological status trend has remained stable since transects were established in 2002, with a mid-range score of 20 (Table 1) for both ungrazed and grazed transects indicating that the community is still recovering from the effects of fire and nearby recreational interests. Other components of the health score suggest the plant community has good structure, little bare ground, few weeds, high litter levels, and is dominated by native species

Table 1. Lynx Bench Range Reference Area species composition data (T denotes trace amounts).

Species	Avg. In	In 2002	In 2007	In 2013	Avg. Out	Out 2002	Out 2007	Out 2013
Aspen	**1**	1	T	T	**T**	T	0	0
Snowberry	**9**	9	4	9	**16**	18	11	17
Dwarf bilberry	**2**	3	3	0	**11**	3	10	16
Rose	**2**	2	1	1	**2**	2	T	1
Yellow penstemon	**13**	7	11	17	**8**	5	10	6
Strawberry	**6**	3	4	7	**6**	7	4	6
Northern bedstraw	**5**	3	3	2	**7**	6	12	3
Yarrow	**5**	3	3	5	**3**	2	2	2
Sticky purple geranium	**3**	1	T	5	**2**	T	2	3
Pinegrass	**9**	4	7	16	**11**	14	9	10
Kentucky bluegrass	**13**	9	19	6	**10**	8	14	9
Blunt Sedge	**6**	1	8	10	**4**	6	5	2
Slender wheatgrass	**1**	T	2	T	**1**	T	T	1
Timothy	**T**	0	T	0	**3**	2	3	3
Ecological status score (25)	**20**	20	20	20	**20**	20	20	20
Species richness (mean)	**28**	30	24	26	**23**	20	28	21
Mean species diversity (H)	**2.9**	3.06	2.70	2.76	**2.7**	2.58	2.88	2.58

Species richness represents the total number of different species present - the greater the number of species present and the more even their distribution equals higher species diversity. Research from a number of different rangeland reference areas in southwestern Alberta has illustrated that sites that receive moderate levels of grazing stress generally express higher species diversity than overgrazed or ungrazed sites (Willoughby 1992).

At this time there is little trend in species diversity that would indicate changes to successional status either from grazing or a post-fire response. Both the grazed and ungrazed transects have high levels of species diversity which would indicate a moderate level of environmental disturbance from both grazing and fire.

Conclusion

Information from the Lynx Bench Range Reference Area indicates that current grazing practices are not having an impact on the species composition, ecological status, or health of the plant community. The grazed community is able to perform the same functions as the ungrazed reference community, and both are undergoing the same long term succession as a response to the Lost Creek fire.

It is important to note that this reference area is found in a relatively high-traffic recreation area adjacent to the Lynx Creek Provincial Recreation Area and campground. These added disturbance pressures are likely impacting the plant community, and increasing the likelihood of invasive species and soil exposure that can affect species composition and range health.

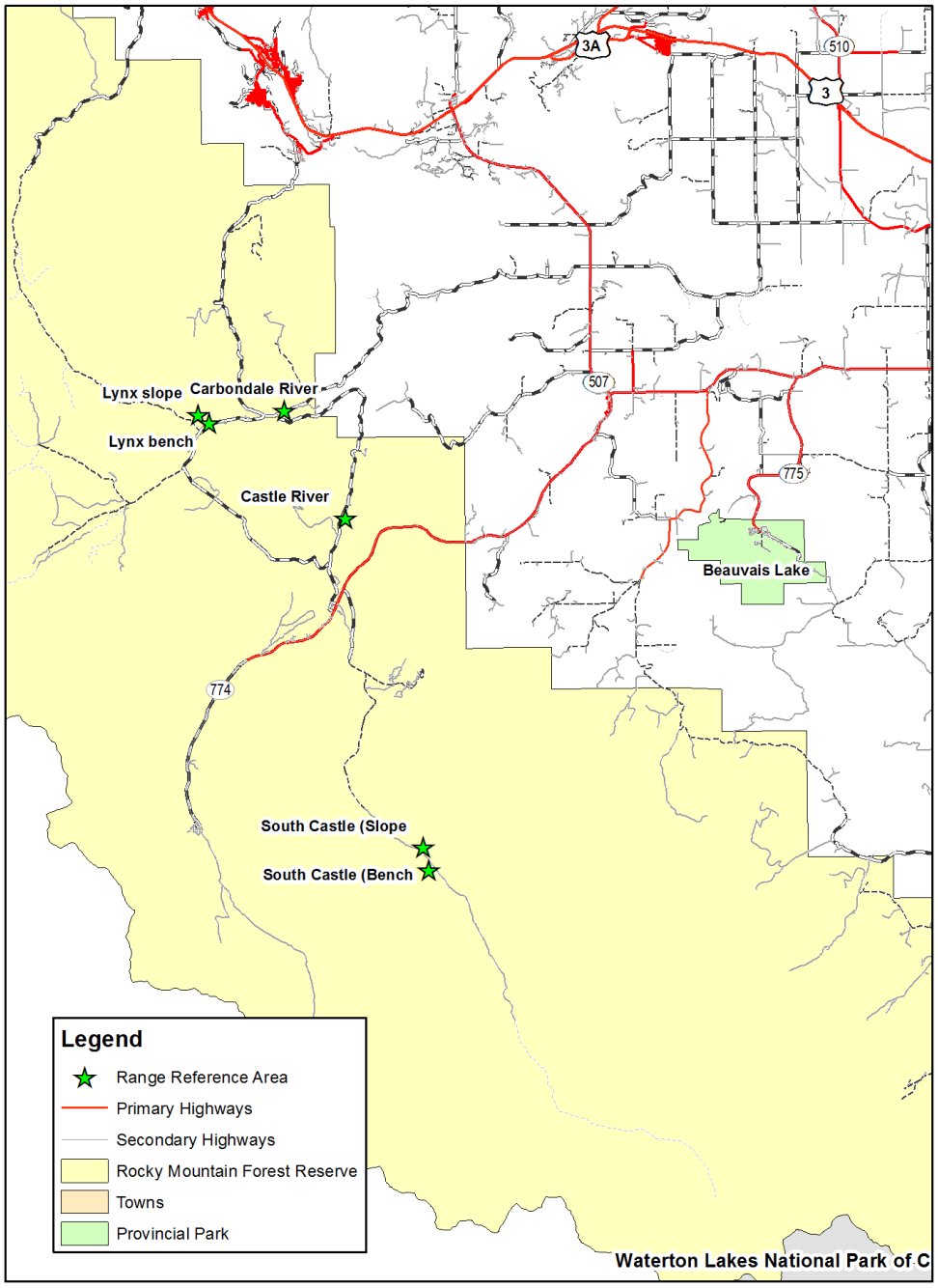

Figure 4. Map of Range Reference Area locations.

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