Evaluating Livestock Use of Boreal Grazing Lands

Little Smoky River Project

Summary Report

Alberta Government

Introduction

On northern Alberta grazing leases, it is a common practice to clear some forested areas and develop those areas as tame pastures. The higher forage production of the tame forages provides additional grazing opportunities but their attractiveness can also result in other areas of the disposition receiving very little use by livestock.

Objectives

In 2008, a GPS collar project was conducted on a grazing lease northeast of Valleyview to document:

1. cattle use of rangeland plant communities, as well as
2. the influence that tame pasture has on overall livestock distribution throughout the grazing disposition

Site Description

This grazing lease is approx 2630 acres (1064 ha) in size. 78 acres (31 ha) of private land are fenced and grazed with the grazing lease.

The grazing lease is located almost entirely within the Little Smoky River valley. The majority of the area (71%) is made up of forested plant communities, primarily aspen dominated. Water covers about 5% of the lease area while sedge, marsh reedgrass or willow dominated wetlands make up about 7%. Most of the waterbodies and wetlands are located in oxbows that have formed when old river meanders have been cut off from the active river channel. Shrublands and small grassland areas are found on about 5% of the lease area. The Little Smoky River channel forms the east boundary of the disposition.

Scattered throughout the grazing lease are 12 tame pastures, totalling about 363 acres (pasture size ranges from 9.5 to 67 acres with an average size of 30 acres).

The private land consists of 30 acres of tame pasture, 39 acres of deciduous forest and 9 acres of willow/sedge.

The grazing lease is cross-fenced into 3 pasture units allowing the use of a rotational grazing system. The private land provides a fourth pasture unit (Figure 1).

Cattle water primarily from the oxbow lakes and from beaverponds. There are only a few locations where cattle water directly from the Little Smoky River.

Methods

Plant community types (PCTs) were identified during field inspections and mapped (Figure 1).

The lease area was grazed from June 1 to October 11 by 144 cows and 6 bulls. Nine cows were collared with Lotek 3300 GPS collars. The GPS collars were programmed to attempt a location fix every ten minutes during the daylight hours (when the cattle were expected to be most active) and every hour during the night when they would typically be less active. At the end of the season, recorded data was downloaded from the collars, differentially corrected and analyzed. Analysis of the results is based on the assumption that the nine collared cows represent the behaviour of the entire herd.

Cattle use of the different plant community types was compared to the availability, or amount, of each plant community type in each pasture unit. Preference or avoidance of each PCT was calculated using Ivlev's electivity index.

AUMs utilized from each area were estimated and compared to the recommended carrying capacity of that area to illustrate the implications for range health and lease management.

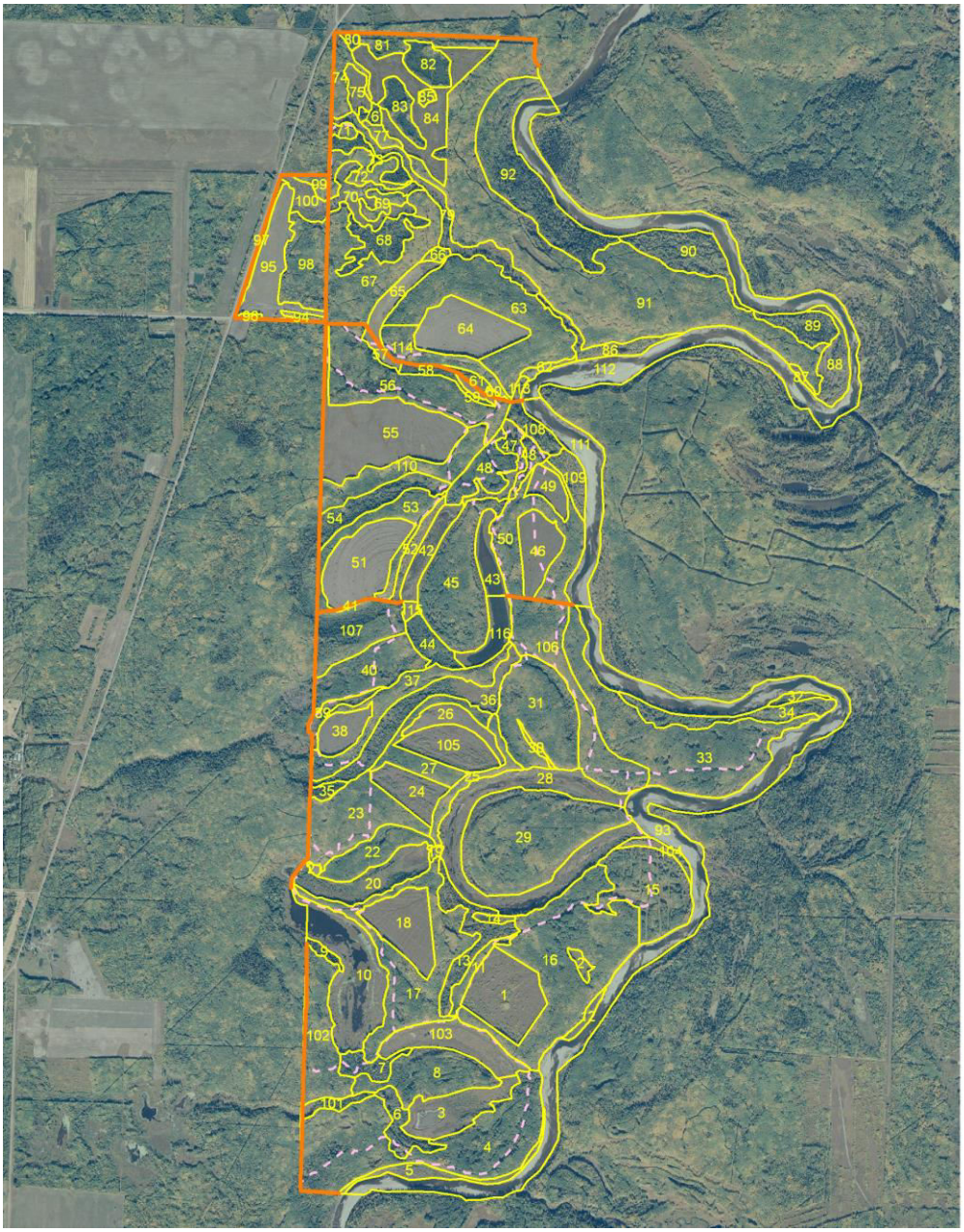

Figure 1: Overview of Project Area. Plant Community Type polygons are outlined in yellow, fences are shown as orange lines, trails as pink dashed lines.

Results & Discussion

In each pasture unit, cattle showed a very strong preference for the tame pastures and areas in close proximity to them. Examination of the GPS collar locations recorded during one of the grazing rotations will help illustrate this:

Middle Pasture Unit: July 8 - 28

Fence, trail, salt and GPS collar locations recorded in the Middle Pasture between July 8 and 28 are shown in Figure 2. Plant Community Types are described in Table 1.

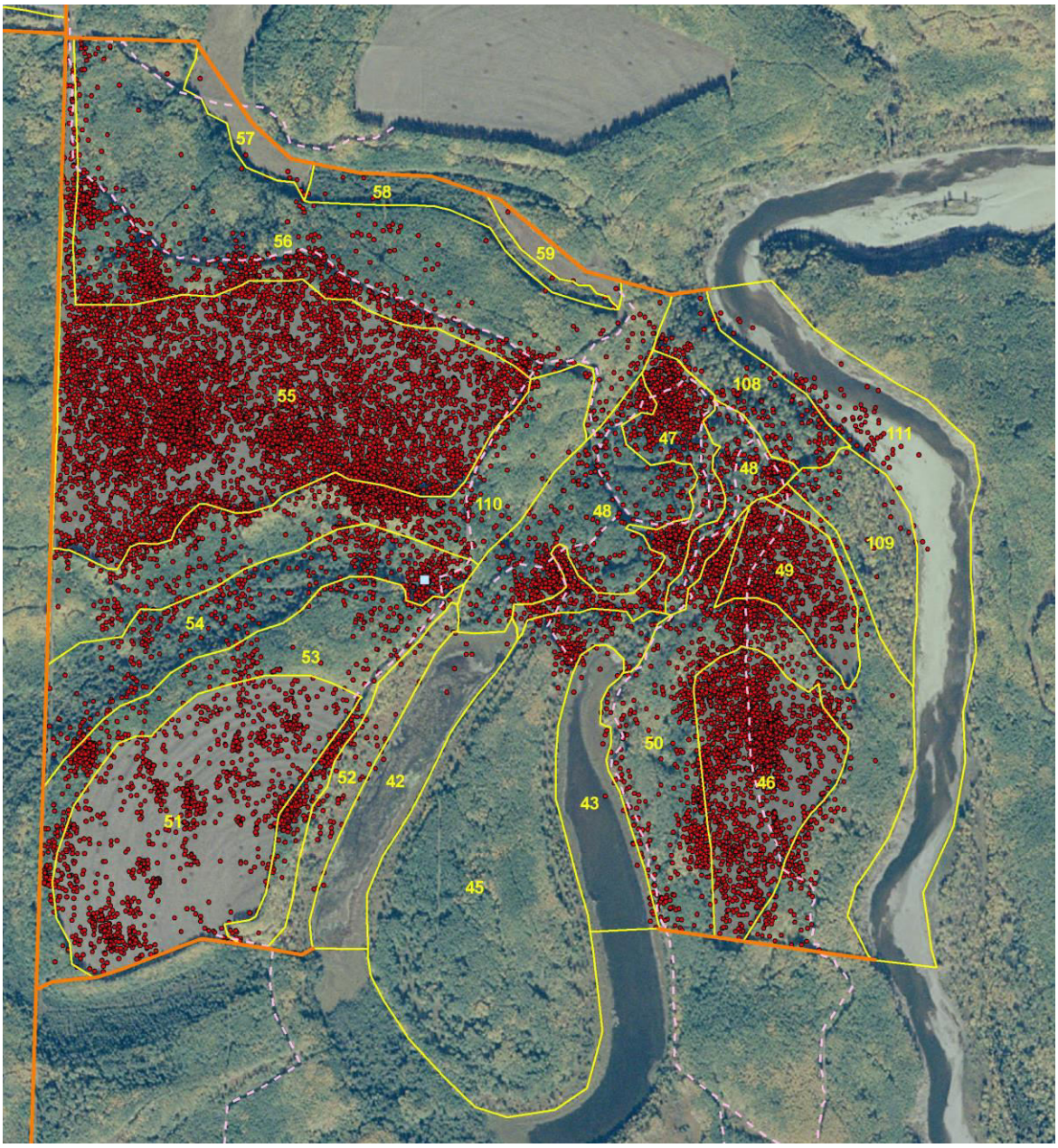

Figure 2: Middle Pasture Unit, July 8 – 28. Plant Community Type polygons are outlined in yellow, fences are shown as orange lines and trails as pink dashed lines. GPS locations are shown as red dots, salt locations are shown as light blue squares.

Table 1: Middle Pasture Unit Plant Community Type Descriptions

Polygon	Description
42, 43	Old oxbow; 80% open water, 20% Sedge
45, 50, 53	Aspen / Rose /Tall Forb
46, 49	Tame pasture: Creeping Red Fescue, Brome, Timothy
47	80% Kentucky Bluegrass – Dandelion; 20% Balsam Poplar – Aspen / Red Osier Dogwood
48	Balsam Poplar – Aspen / Red Osier Dogwood
51	Tame pasture: Creeping Red Fescue, Brome
52, 110	Aspen / Saskatoon
54	Balsam Poplar – Aspen / Willow
55	Tame pasture: Brome, Creeping Red Fescue
56	80% Aspen/Rose/Tall Forb; 20% Aspen – White Spruce/Rose/Marsh Reed Grass
57	Tame pasture: Kentucky Blue Grass, Creeping Red Fescue, Brome
58	Willow – River Alder / Marsh Reed Grass
59	Reverting tame pasture: Rose / Creeping Red Fescue-Sedge
111	River and gravel bars
108, 109	White Spruce – Balsam Poplar – Aspen / Rose / Twinflower

The Middle pasture unit is 465 ac (188 ha) in size. 4 main tame pastures have been developed in this unit along with 2 small areas seeded to tame forages along the north fenceline (Figure 2).

To determine which areas and PCTs were preferred by cattle, electivity indexes were calculated for each PCT in this pasture unit (Chart 1). If PCT use is equal to availability, the electivity index is zero. Positive values indicate that the PCT is used more than expected (preference) while negative values indicate that the PCT is used less than expected (avoidance).

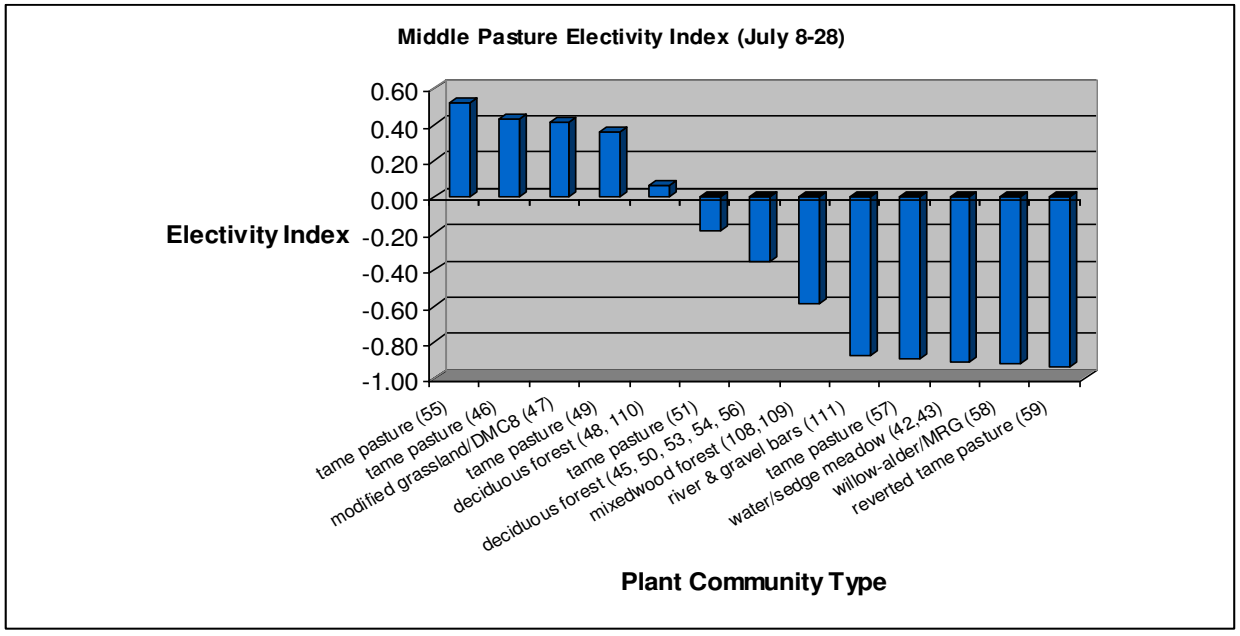

Chart 1: Middle Pasture Electivity Indexes. Numbers in brackets following PCT names refer to the corresponding vegetation polygon numbers. Deciduous forest polygons are split into 2

groups based on their electivity indexes (preference or near neutral in one group, avoidance in the other).

3 of the 4 main tame pastures (polygons 55, 46 & 49) had positive electivity indexes. Approx 56% of all GPS locations recorded in this pasture unit occurred in these 3 tame pastures. Although they only made up about 19% of the area, these tame pastures produce much of the forage in this pasture unit (nearly 50% of the carrying capacity).
The modified grassland area (polygon 47) is located between the main water sources in this pasture unit and is also located between the high use tame pastures (55 and 49 & 46). Major access trails run through the area. These factors, along with the availability of forage and shade in this PCT and its forage quality (lush, sub-irrigated growth) all combine to make this area attractive to cattle, resulting in a positive electivity index.

All the other vegetation polygons had negative electivity indexes, with the exception of one of the deciduous forest PCTs adjoining a tame pasture area. One other deciduous forest polygon had an electivity index near zero. This area is located between the preferred tame pastures / modified grassland area and the main watering location.

Areas that livestock prefer to graze if given free choice are called **primary ranges**. **Secondary ranges** are areas that have useable forage but are unused or only lightly grazed when livestock distribution is not controlled. If livestock are allowed to choose where they can graze, secondary ranges normally receive little use unless the primary ranges are overutilized. In this pasture unit, the main tame pasture areas and the modified grassland area are primary range types while the other PCTs would be considered secondary range types.

Cattle use of the secondary range types decreased as distance from the primary range plant community types increased (Chart 2). Over 25% of the locations recorded in the secondary range areas were within 10m of a primary range area, nearly 60% were within 30m and approx 74% were within 50m of these areas. Electivity indexes are negative for distances greater than 30m from primary range areas. Areas further than 100m from the primary range plant community types accounted for only about 12% of the secondary range use, despite making up approximately 50% of the secondary range area (35% of the total pasture unit area).

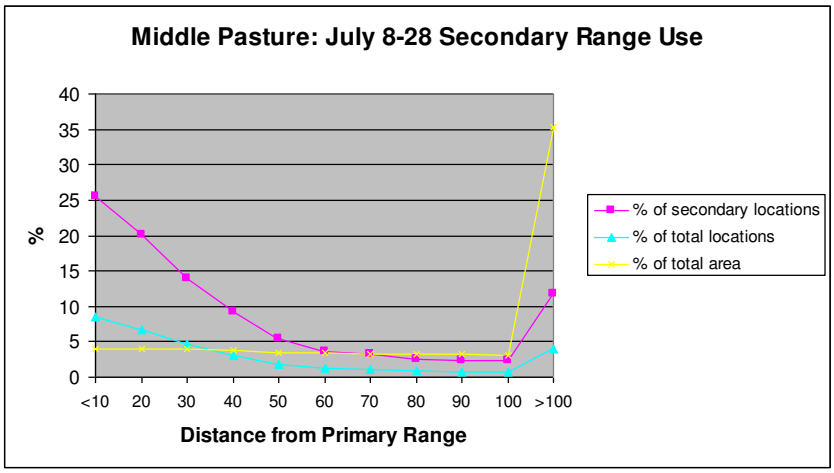

Chart 2: Middle Pasture Unit, July 8-28: Cattle Distribution Relative to Primary Range

86% of all the locations recorded in the Middle Pasture Unit during the July 8 – 28 grazing period were recorded on the 4 tame pasture areas and the modified grassland or within 30m of these areas. Cattle had a strong preference for the primary range areas (tame forages and modified grasslands) in all pasture units throughout the grazing season. Secondary range use varied between pasture units, but in general, areas within 30 – 50m of the primary range areas were heavily used by cattle for shade, shelter and forage.

Comparing the estimated utilization of each plant community type to its recommended ecologically sustainable stocking rate (ESSR) and the carrying capacity (CC) of each area can provide an indication of the impacts of different levels of use on the preferred and non-preferred areas.

The ESSR of a plant community type (expressed as AUMs/acre or hectares/AUM) is the maximum level of grazing that it can sustain without undergoing a decline in health and function. Carrying capacities (expressed in AUMs and calculated by multiplying the ESSR of a PCT by its area) represent the maximum amount of grazing that can be supported by a unit of rangeland (plant community type, pasture unit or grazing disposition) without undergoing a decline in range health. A carrying capacity is a theoretical maximum – it assumes that the entire area is accessible and evenly utilized by livestock. In reality, this is rarely the case. Adjustments must be made to take into account access factors (areas that are inaccessible to livestock due to natural barriers) and management factors (livestock distribution under current management). The estimated number of AUMs available after these adjustments have been made is known as the grazing capacity.

For each pasture unit, the number of AUMs utilized during each grazing period were calculated and then attributed to the individual PCTs based on the percentage of the total GPS locations that were recorded in each PCT. While the assumption that 'locations = utilization' does not account for differing uses of different plant community types (forage, shade & shelter, water, travel corridors, etc), it does show where cattle are spending their time and therefore is a good indication of the relative impact and disturbance occurring in each plant community type.

In this project, the need to make adjustments to the rated carrying capacity of an area to determine the appropriate grazing capacity is best illustrated by the utilization numbers from the South pasture. Although the estimated overall utilization of the South pasture was well below the rated carrying capacity (48%), the primary ranges and areas within 20m of those areas were utilized to their rated carrying capacity. The remainder of the secondary ranges, however were underutilized (less than 28% of secondary range carrying capacity). The grazing capacity of the South pasture under current management would be very close to the number of AUMs utilized during the project. Increasing the number of animals or the length of the grazing period to try to increase the number of AUMs obtained from this pasture unit without making any changes in management would result in overutilization of the primary range areas (and secondary ranges in close proximity) without much change to the use of the outlying secondary range areas.

In all pasture units the tame pasture areas (primary range) were preferred and often heavily used by cattle. The degree of use varied between pasture units and between individual tame pastures

within a pasture unit. Secondary range use was closely tied to its proximity to primary range areas, with other factors such as location of water sources and travel corridors having an influence as well.

If possible, tame pasture areas should be fenced separately from forested areas. On this grazing disposition, topography and natural features such as wetlands and oxbow lakes largely determined the locations where tame pastures could be developed. As a result of their scattered locations, fencing these tame forage pastures separately from the surrounding forested plant communities is not practical in most cases. However, there are locations, such as in the Middle pasture, where additional crossfencing and water development could be used to help control livestock distribution.

Developing an additional water sources, particularly in the North pasture, would help improve livestock distribution as well. Additional trails would help improve cattle use of some of the secondary range areas, particularly in the North and South pastures.

Moving salt from locations that are close to tame pasture areas onto trails in the secondary range areas is a very effective, low cost, way to improve livestock distribution. In particular, remote secondary range areas like those in the eastern portions of the South and North Pastures need an attractant like salt to draw livestock into the area. Since this project was conducted, the lessee has adopted the practice of salting in these areas and has reported increased livestock use of those areas.

Conclusion

This project highlights the importance of considering livestock preferences for different plant community types when developing a range management plan for a grazing operation, especially when this includes creating tame pastures. Any range management plan needs to be tailored to the specific ranching operation that it is being developed for, giving consideration to the unique characteristics of the landbase, plant community types present, other resource values and the available resources, goals, time and commitment of the manager.

For More Information

This report summarizes the key results of this project. The complete report and additional resources and information on rangelands can be found at srd.alberta.ca

For more information on the Little Smoky River GPS collar project contact:

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