Summary of Findings:

Upper Carmen Creek Riparian Grazing Study and Plan

Submitted to:
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Introduction

The Carmen Creek Riparian Grazing Study and Plan was a cooperative effort between the Upper Salmon Basin Watershed Program (USBWP), the Idaho Governor's Office of Species Conservation (OSC), Bonneville Power Administration (BPA) and private landowners. The intent of the Carmen Creek Study and Plan was to examine the effects of a planned grazing regime on stream banks and vegetation of a one-mile reach of Carmen Creek. The plan was developed by Ken Sanders, Ph D., and was implemented in the Fall of 2011. It was theorized that the grazing regime would have minimal livestock impacts and maintain riparian health in anadromous fish habitat. A secondary component to the study was to monitor the change in vegetation with and without fall grazing.

To validate the hypothesis of maintaining stream health, physical measurements of woody browse utilization was collected every fall to determine if woody species were being impacted by livestock use. To support the woody browse data, photos were taken on the Multiple Indicator Monitoring site. Accompanying the stream data, Sanders established three, 16' x 16' exclosures in representative foraging areas for comparison of species composition for ungrazed vs. grazed. Photomonitoring inside and outside of the exclosures was conducted through the course of the study bi-annually.

Grazing Plan

The total acreage of the riparian grazing unit is approximately 53 acres. Developed by Sanders, the grazing plan directed the McFarlands to only graze in the fall months, specifically from late October to early November. Based upon soil survey data, the estimated stocking rate was 50 head of cows for 10 days. The plan was not restrictive to exact dates or stocking rates because grazing was dependent on when the cattle came off the range.

As mentioned above, grazing in the riparian pasture and adjacent uplands slightly differed year to year with the kind of cattle, numbers, and duration. Grazing occurred as early as the 10th of September and lasting as late as the 8th of November (see Table 1). Through the course of the study, cattle rarely exceeded moderate utilization in riparian meadows. Reporting AUM's (Animal Unit Months) was an addition to the study to provide an idea of the amount of forage utilized by livestock and to help as an assessment of monetary value for the landowners.

Table 1. Depicts by year the number of cattle, the number of days, and the total amount of forage consumed by cattle (AUMs) on the Carmen Creek Grazing Plan and Study area. For 2019, most of the utilization occurred from yearlings during the mid to late summer with some use later in the fall by dry cows. Where 2019 use was inconsistent with the grazing plan and not having finite numbers, calculation of AUMs was omitted for 2019.

Year	Head Count	No. of Days	AUMs
2011	36	20	23.4
2012	39	26	31.4
2013	32	33	34.6
2014	32	24	25.0
2015	60	21	40.3
2016	45	21	30.2
2017	40	25	32.8
2018	50	21	34.4
2019	-	-	-
Average	**42**	**24**	**32**

Findings – Data and Inferences

Multiple Indicator Monitoring Site – Stream Health

In 2012, baseline stream and vegetation data were collected using the MIM protocol and subsequently repeated in 2015. The only statistically significant change in the three-year period was the amount of stream bank cover going from 61% to 78%. A quick response in the amount of herbaceous vegetation is a reasonable expectation given the ability for plants to gain vigor and complete two full growing cycles. Positive stream health changes certainly occurred on the MIM site with an increase in alder and cottonwood saplings. The most telling reading would have been in 2020 and would more than likely have shown statistically significant improvements in stream health (see Figures 1 - 4).

Figure 1. MIM site stream start 2012.

Figure 2. Note the young shrubs establishing to right of board.

Figure 3. MIM site 2012. Note the grasses in the circle.

Figure 4. MIM site 2018. Note the alders and change from grasses to bank-stabilizing sedges and cattails in background.

Multiple Indicator Monitoring Site – Woody Browse Utilization

As mentioned above, woody browse data was collected over the nine-year period and averaged 15% utilization on the MIM site for all woody species sampled. This is a relatively low level of use and supports the successful recruitment of young trees and shrubs along the greenline.

16'x16' Grazing Exclosures

The three grazing exclosure were established in representing foraging areas but slightly differed in soil and vegetation type. The lower exclosure was established on an alluvial/outwash deposit with a much thinner top-soil layer. The middle exclosure was placed on a deeper-soil, mesic meadow while the upper exclosure was set on the toe slope of a hill with a similar soil type as the middle exclosure. Photo monitoring was the only data collected for all of the exclosures.

The lower exclosure was largely dominated by knapweed (*Centaurea stoebe*) both inside and outside of the exclosure. What is interesting, knapweed density seemed to fluctuate over the years both inside and outside of the exclosure. Years of heavier precipitation and competing grasses likely played a role in the decrease of knapweed. In comparing the last two years of photo monitoring, overall knapweed diminished but does not appear to be significantly different inside or outside the exclosure (see Figures 5 and 6).

Figure 5. Lower Exclosure 2012. Note the knapweed inside and outside of exclosure

Figure 6. Lower Exclosure 2018. Vegetation composition does not appear to have changed much in 6 years.

In terms of production, the middle exclosure was the most productive in and outside among all exclosures. Changes in vegetation composition were more prominent in this exclosure compared to the rest, visually speaking. Three years into the study weedy forbs began to appear in the exclosure. By 2015, four years into the study, thatching (dead herbaceous material that carpets the ground) was present (Figure 7). The following year Canada thistle (*Cirsium arvense*) appears in the exclosure and remains to present (see Figures 8 and 9).

Figure 7. Middle exclosure thatching, August 2015. Note the dead herbaceous material inside the exclosure on the right versus outside.

Figure 8. Middle exclosure 2012.

Figure 9. Middle exclosure 2019. Note the thistle.

The upper exclosure had a similar trend for weeds as the middle exclosure. Canada thistle was first observed in 2015 and was last photographed in the exclosure in 2019 (see Figures 10 and 11). There appeared to be a change in palatable grass and grass-like species in the two meadow type exclosures, most notably in the upper one. Redtop (*Agrostis stolonifera*), timothy (*Phleum pratensis*) and blue grass (*Poa pratensis*) are significantly less visible in photographs from 2015 to 2019. The lack of diversity of grasses and increase in weedy forbs is likely the result of excluding disturbance (grazing). The most notable change in this exclosure was the Bebb's willow (*Salix bebbiana*) that went from a twig to a tree in less than eight years.

Figure 10. Upper exclosure 2012.

Figure 11. Upper exclosure 2018. Note the willow, thistle, and less knapweed outside.

Wildlife Observations

In this study it was not specified which herbivore was the one browsing on the MIM site. It is reasonable to expect that with an increase in white tail deer numbers over the last decade on Carmen Creek, a significant portion of browsing was done by them. In the Fall, it was common to see scrapes like these below (Figures 12 and 13). Disturbance like this may have a negative effect on the recruitment of young cottonwood, birch, and alder trees and shrubs.

Figure 12. Young alder scraped by white tail deer. MIM site 2019.

Figure 13. Another young alder scraped by white tail. Survival of alder unknown. MIM site 2019.

Take-home Points and Recommendations for Future Grazing Strategies

Take home

- Fall cattle grazing is a compatible use for maintaining and even improving riparian resource conditions in similar riparian settings like Carmen Creek.
- I believe it is acceptable to graze livestock as early as the 10th of September as long as there are plenty of palatable forage grasses available (> 6" grass stubble height).
- Utilization of grasses and time spent by livestock diminishes as colder temperatures settle in creek bottoms.
- Spotted knapweed did not appear to show much of a response to fall grazing. Grazing knapweed earlier in the season may reduce plant vigor and seed production.
- In productive soils, either thatching and/or an invasion of weeds and weedy forbs will occur without the presence of grazing or some other disturbance.
- Expect year to year variation in weed distribution and abundance due to climatic and environmental factors such as timing of rain and available soil moisture.
- There is a need for more data on excluding grazing post ten years, specifically on weed invasion and native plant composition.

Recommendations

- Recommend placing game cameras to help discern which herbivore is doing the browsing and if there is a particular time of year when most of the browsing occurs.
- Recommend collecting physical data measurements and/or including permanent photo plots inside grazing exclosures to better quantify the actual change of weed and native vegetation composition.
- For future grazing pilots, I recommend incorporating a late-May to June grazing rotation (does not have to be yearly) as a stand-alone project or in addition to a fall grazing program. Monitoring plant diversity and weed abundance would be an important component of a monitoring plan and should highlight differences of the seasonal grazing regimes and the value of grazing as an ecological tool.