

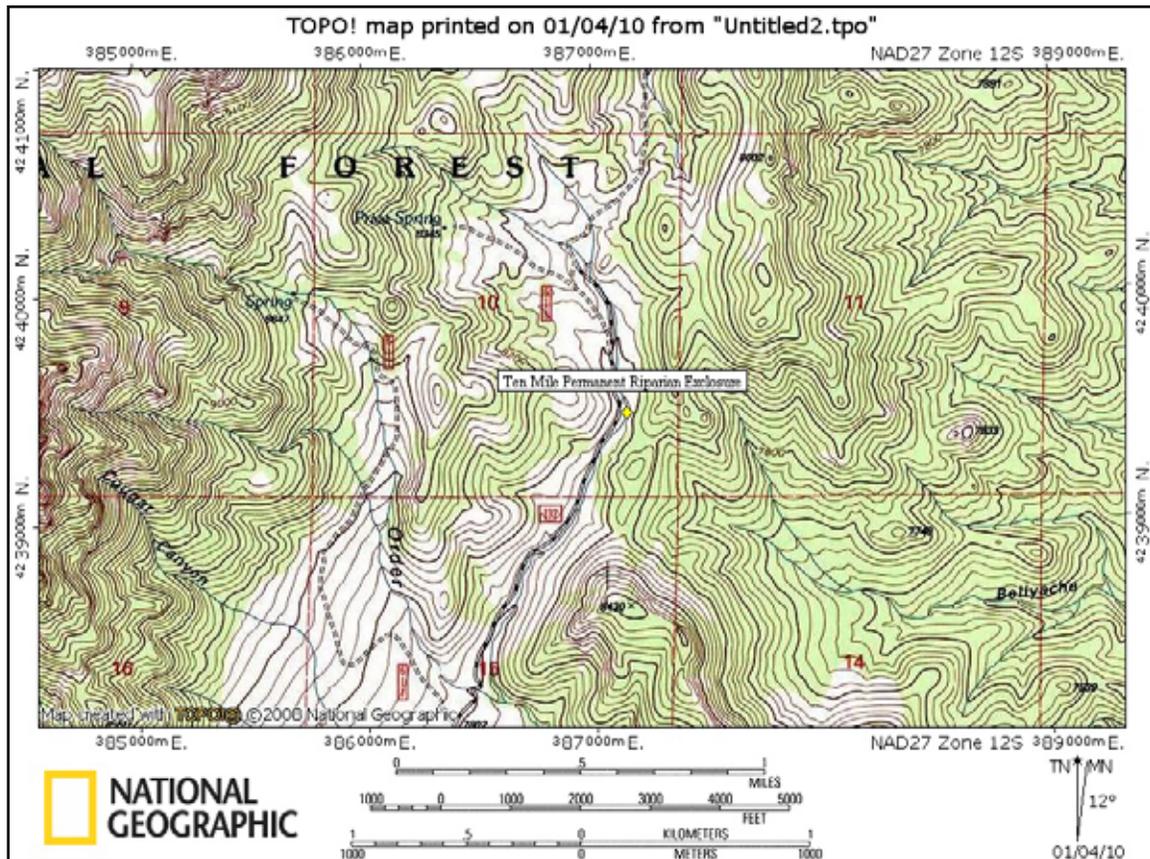
Ten Mile Allotment Riparian Permanent Range Cage

Established May 20, 2009

(1) October 14, 2009

(2) September 28, 2010

(3) September 9, 2011



Ten Mile Allotment Riparian Permanent Range Cage	Established May 20, 2009
Fishlake NF/Beaver RD	Allotment: Ten Mile Pasture: Ten Mile
Aspect: Gently sloping wet meadow on the east side of FR 132.	Elevation: 7,158'
Range Cage Location: (NAD CONUS 27) 12 N 387202E 4241511N NAD 83- 387137E 4241715N	Outside Transect Location Begins 12 N 387125 E NAD83 387060E 4239442N 4239646N Ends 12N 387114E NAD 83 -387049E 4239470N 4239674N
Inside Transects Two transects run N to S from within 6" of cage fence. A random number was used to	Outside Transect Stake at south end of transect.

determine which square opening in the fence would be used for the transect	
Oct 13, 2009 Surveyors: Hoskisson/Otting September 28, 2010 surveyors: Hoskisson/Wheeler September 9, 2011 Surveyors: Hoskisson/Ratcliff/Young	

The 16' X 16' Ten Mile Allotment riparian permanent range cage is located in the Price/Cougar Pasture, adjacent to FS 132, in a riparian meadow dominated by Kentucky bluegrass and Nebraska sedge with some dandelions (Fig. 1). The nearly-level meadow is in the Price Spring drainage about one mile north of its confluence with Order Canyon. The riparian meadow resulted from an old check dam along the drainage. Below the check dam the drainage enters a narrow canyon. Several more check dams were constructed in the drainage below the meadow at some time in the past. There are also check dams on the small brook above the riparian meadow. The riparian meadow is bordered by slopes on the east and west sides. Pinyon, juniper, mountain mahogany, bitter brush, service berry and other shrubs grow on the slopes. The meadow is immediately surrounded by sagebrush and rabbit brush. The sagebrush and rabbit brush grow into the meadow on the drier upper end of the meadow. After joining Order Canyon the Price Spring drainage eventually flows into City Creek and then into the Piute Reservoir just north of the town of Junction. The meadow is adjacent to FS 132.

The riparian meadow is heavily grazed by cattle, with both the Kentucky bluegrass and sedges being grazed to the same height.

On May 20, 2009, Grand Canyon Trust photographed the enclosure from each side for a record. No detailed survey of all species within and outside the enclosure has been made.

On October 14, 2009, Grand Canyon Trust read two point-intercept transects running N-S within the transect (starting 6" from inside the cage fence). The height of all plants intercepted and the ground cover were recorded every 2' for a total of 60 points."

The outside comparison to this permanent riparian range cage is a 100' point-intercept transect starting 51' from the SW corner of the enclosure (see table below for details). On October 14, 2009 Grand Canyon Trust read the outside transect as within the range cage, but at 2' intervals rather than 6".

A large enclosure was built around this meadow in the fall of 2009 and finished in the spring of 2010. The enclosure encompassed the 'outside' transect for this riparian range cage. Since there are no other comparable meadows in this area, the Grand Canyon Trust read the same transects as in 2009, but with an understanding that only wild ungulates can now graze in the meadow outside the range cage.



Fig. 1 (5/20/09) Riparian meadow permanent range cage



Fig. 2 (5/20/09) Sedges, grasses, dandelion in the meadow 1.5"-2" tall at the time of range cage construction.



Fig. 3. (05/20/09) A photo was taken at each corner showing inside and outside of the range cage. This is the SW corner looking E.

Transect Readings

(4) October 14, 2009

(5) September 28, 2010

(6) September 9, 2011

The first transect reading was made just four months after the riparian meadow range cage was established, but it encompassed the mid- and later portions of the growing season. Figures 4 and 10 show the overall contrast between the range cage and meadow.

(2009) Within the range cage, voles had built grass tunnels through the sedges/grass in the SE quadrant of the range cage, but sign of voles was absent from the meadow outside the range cage. The only plant diversity beyond sedges and Kentucky bluegrass in the enclosure was found on the vole mounds where rabbitbrush, dandelion, and an aster were found (Figs. 5-6).

Kentucky bluegrass averaged 13" tall within the enclosure; 1.1" (standard is 1.5") outside. *Carex nebrascensis* (dominant) and *Juncus balticus* (less common) averaged similar height (13") inside. *Carex nebrascensis* was grazed to 1.9" (standard is 4") outside (Figs. 8-9). No *J. balticus* was encountered on the outside transect). Dandelion (*Taraxacum officinale*) was the only forb encountered along the outside transect.

Bare soil was 7% inside the cage; 14% outside. Both *Carex nebrascensis* and *Kentucky bluegrass* are rhizomatous, forming dense vegetation.

A second range cage (8' X 16') was constructed (by the Forest Service?) at some time after this range cage (Fig. 10). Chicken wire encases the lower portion.

(2010) The transect outside the enclosure for this area has been enclosed within a larger fence that no longer allows cattle to graze in this area. However, it is likely that wildlife still graze in this large enclosed area, which provides an opportunity to compare wild + domestic ungulate grazing (outside the larger fence); wild ungulate only grazing (within the larger fence) with no grazing (inside the range cage).

However, water usually runs perennially through this meadow, but in late September of 2010, there was no water running through this meadow at all. This could be due to the excess water being captured by the relatively tall and dense riparian vegetation up stream in the large Price Spring enclosure (built in 2010).

Outside the range cage, total vegetation cover was 71%, litter cover 21% and bare ground 8%. Water sedge (*Carex aquatilis*) was the dominant graminoid at 52% cover. Kentucky bluegrass (*Poa pratensis*) was also common at 8% cover. Slender wheatgrass (*Elymus trachycaulus*), present in the drier portion of the transect, contributed 5% cover.

Inside the range cage, the total vegetation cover was 83%, litter cover 14%, and bare ground only 3%. Water sedge was most common here as well at 56% cover, with Baltic rush (*Juncus balticus*) at 16% cover. A small amount of musk thistle (*Carduus nutans*) was also present in this area. Since the population of this noxious weed is so small at this point, control efforts should be a high priority in this area.

(2011) The permanent riparian enclosure remains inside the larger Price Spring enclosure. Both quantitative transects showed 100% vegetation cover. However, outside the smaller enclosure, bare ground under the plants was slightly greater as compared to inside the smaller enclosure (32% and 8% respectively). It also appeared that running water had returned

to this lower enclosure as water was a common presence under the plants. The sedges were slightly, but insignificantly taller within the small enclosure (24") as opposed to outside the small enclosure (21.7").

Ground with no plant cover overhead decreased from 14% outside the small enclosure in 2009 (before the larger enclosure was constructed in 2010) to 0% in 2011. This illustrates the potential of a wet meadow like this for essentially 100% ground cover by native species. Dandelion has declined from 3% to 0% along the transect outside the small enclosure and within the larger enclosure.

The larger enclosure is accessible to elk.

Understory/Ground Cover

Inside Exclosure - 2009

Plants	Cover (%)	# Species	Height (in.) (average)	Two most common species
Tree	0	0		
Shrub	0	0		
<i>Poa pratensis</i>	72	1	13	<i>Poa pratensis</i>
Other Grass	0	0		
Grass-like Plant	74	2	13	<i>Carex nebrascensis</i> , <i>Juncus balticus</i> var. <i>littoralis</i>
Forb	4	2	5	<i>Brassica</i> sp., <i>Aster</i> sp.
Totals	88	5		
Non-plant Cover %:	Bare	Rock	Litter	Lichen, moss, biological crust
	7	0	93	0

Plants intercepted on transect inside range cage, in order of frequency

<i>Poa pratensis</i>	41
<i>Carex nebrascensis</i>	34
<i>Brassica</i> sp.	1
Asteraceae sp.	1

Inside Exclosure - 2010

Plants	Cover (%)	# Species	Height (in.) (average)	Two most common species
Other Grass	0	0		
Grass-like Plant	72	2	12	Water sedge (<i>Carex aquatilis</i>), Baltic rush (<i>Juncus balticus</i>)
Totals Cover	88	5		
Ground Cover	Bare	Rock	Litter	Lichen, moss, biological crust
Ground Cover (no overhead plants)	3	0	14	
Ground Cover (includes beneath plants)	9		91	

**Plants intercepted on transect inside range cage,
in order of frequency (2010)**

Water sedge	<i>Carex aquatilis</i>	56%
Baltic rush	<i>Juncus balticus</i>	16%

Inside Exclosure – 2011

Plants	Cover (%)	# Species	Height (in.) (average)	Two most common species
Other Grass	4.9	1	15.2	<i>Poa pratensis</i>
Grass-like Plant	99.1	2	29	Nebraska sedge (<i>Carex nebrascensis</i>), Baltic rush (<i>Juncus balticus</i>)
Totals Cover	100	3		
Ground Cover	Bare	Rock	Litter	Lichen, moss, biological crust
Ground Cover (no overhead plants)	0	0	0	
Ground Cover (includes beneath plants)	8.2		8.2	84 (water)

**Plants intercepted on transect inside range cage,
in order of frequency (2011)**

Nebraska sedge	<i>Carex nebrascensis</i>	72%
Baltic rush	<i>Juncus balticus</i>	23%
Kentucky bluegrass	<i>Poa pratensis</i>	5%

Outside Enclosure - 2009

Plants	Cover (%)	# Species	Height (in.) (average)	Two most common species
Tree	0	0		
Shrub	0	0		
<i>Poa pratensis</i> *	55	1	1.1	
Other Grass	0	0		
Grass-like Plant	43	1	1.9	Nebraska sedge (<i>Carex nebrascensis</i>)
Forb	6	1	0.7	Dandelion <i>Taraxacum officinale</i>
Totals	86	3		(
Non-plant Cover %:	Bare	Rock	Litter	Lichen, moss, biological crust
	14	0	86	0

**Plants intercepted on transect outside enclosure,
in order of frequency**

<i>Poa pratensis</i>	27
<i>Carex nebrascensis</i>	22
<i>Taraxacum officinale</i>	3

Outside Exclosure - 2010

Plants	Cover (%)	# Species	Height (in.) (average)	Two most common species
Shrubs	3	1		<i>Chrysothamnus nauseosus</i>
<i>Poa pratensis</i> *	8	1		
Other Grass	5	1		<i>Elymus trachycaulus</i>
Grass-like Plant	52	1	6	<i>Carex aquatilis</i>
Forb	2	1	0.6	<i>Taraxacum officinale</i>
Total cover	71	5		<i>Carex aquatilis, Poa pratensis</i>
Non-plant Cover %:	Bare	Rock	Litter	Lichen, moss, biological crust
Ground Cover (no overhead plants)	8	0	21	
Ground Cover (includes beneath plants)	15		85	

**Plants intercepted on transect outside exclosure,
in order of frequency**

Water sedge	<i>Carex aquatilis</i>	52%
Kentucky bluegrass	<i>Poa pratensis</i>	8%
Slender wheatgrass	<i>Elymus trachycaulus</i>	5%
Rabbitbrush	<i>Chrysothamnus nauseosus</i>	3%
Common dandelion	<i>Taraxacum officinale</i>	2%

Outside Exclosure 2011

Plants	Cover (%)	# Species	Height (in.) (average)	Two most common species
<i>Poa pratensis</i> *	5	1		<i>Poa pratensis</i>
Other Grass	0	0		
Grass-like Plant	95	3	6	<i>Carex nebrascensis, Juncus balticus, Carex aquatilis</i>
Total cover	100	4		
Non-plant Cover %:	Bare	Rock	Litter	Lichen, moss, biological crust
Ground Cover (no overhead plants)	0	0	0	
Ground Cover (includes beneath plants)	32		36	32 (water)

**Plants intercepted on transect outside enclosure,
in order of frequency (2011)**

Nebraska sedge	<i>Carex nebrascensis</i>	90%
Kentucky bluegrass	<i>Poa pratensis</i>	5%
Water sedge	<i>Carex aquatilis</i>	3%
Batlic rush	<i>Juncus balticus</i>	2%



Fig. 4 (10/14/09) The range cage four months after establishment. Note drier eastern portion of the meadow within the cage. Voles have established mounds within the drier, SE quadrant.



Fig. 5. (10/14/09) Rabbitbrush and dandelion seedlings on one of the vole mounds.



Fig. 6. (10/14/09) An aster rooted on one of the vole mound



Fig. 7. (10/14/09) Outside transect, 0' to 100'. Note drier and wetter portions of meadow along transect.



Fig. 8. (10/14/09) Generally, sedges are less than 1.5" tall (standard is 4") outside the range cage.

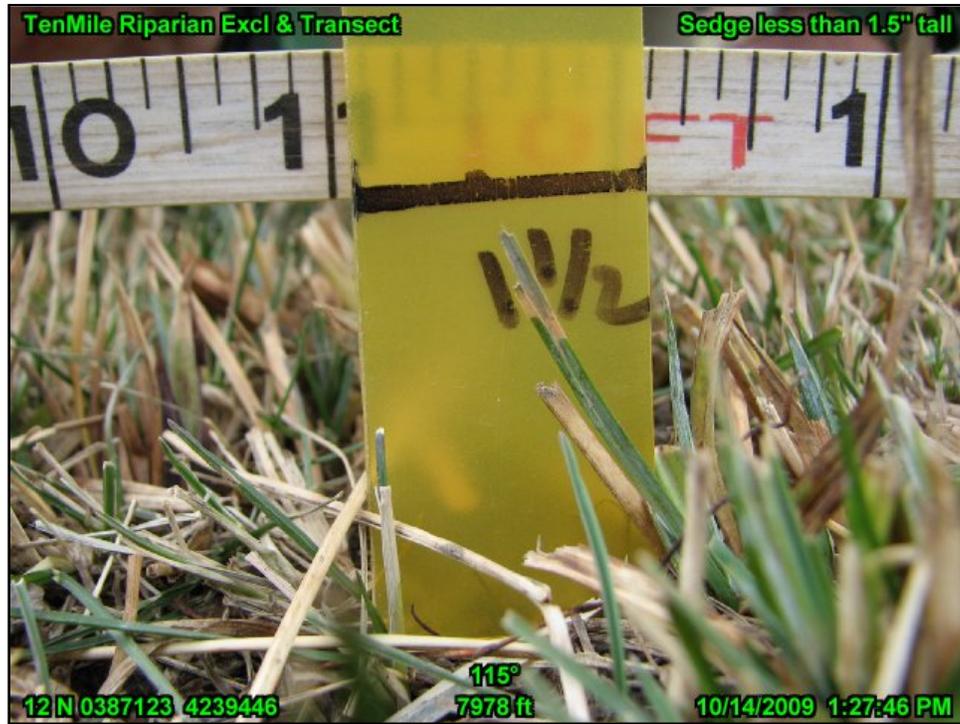


Fig. 9 (10/14/09) A sedge less than 1.5" tall along transect outside the range cage.



Fig. 10 (10/14/09) Second, 8' X 16' range cage built by the FS sometime after May 20, 2009.



Fig 10 (9/28/2010) Inside riparian range cage; tall and dense water sedge.



Fig 11 (9/28/2010) Inside permanent riparian range cage. Since the larger meadow is now fenced as well, differences are not so distinctive between inside and outside the enclosure.



Fig 11 (9/29/2010) 'Outside' riparian transect but now inside a larger enclosure
UTM NAD 83 387080E 4239455N



Fig 12 (9/28/2010) Photo of outside riparian transect from 50' toward 100'. Note newly constructed fence around meadow.



Fig 13 (9/9/2011) Riparian enclosure Ten Mile pasture



Fig 14 (9/9/2011) Riparian enclosure inside larger Price Spring enclosure



Fig 15 (9/9/2011) Overall view of small riparian enclosure



Fig 16 (9/9/2011) Enclosure contrast – some grazing occurring inside enclosure



Fig 17 (9/9/2011) Exclosure contrast on south side of large riparian enclosure

Appendix A – 2010 Cover data in table format

Inside riparian permanent range cage Ten Mile Pasture

Riparian 10 Mile Inside					
	Scientific name	Common name	Cover	Rel cover	Avg height
Total Vegetation Cover			82.5		
Litter			14.2		
Bare Soil			3.2		
Total Ground Cover			96.8		
Grasslike plants					
	<i>Carex aquatilis</i>	Water sedge	55.6	77.8	10.4"
	<i>Carex nebrascensis</i>	Nebraska Sedge	P	P	
	<i>Juncus balticus</i>	Baltic rush	15.9	22.2	13"
		<i>Subtotal</i>	71.5	100.0	
Introduced perennial grasses					
	<i>Poa pratensis</i>	Kentucky Bluegrass	P	P	
Perennial forbs					
	<i>Taraxacum officinale</i>	Common Dandelion	P	P	
Introduced Perennial Forbs					
	<i>Carduus nutans</i>	Musk thistle	P	P	
Shrubs					
	<i>Artemisia tridentata</i>	Big Sagebrush	P	P	
	<i>Chrysothamnus nauseosus</i>	Rubber Rabbitbrush	P	P	

P=Present, but not intercepted by pointer

Inside riparian enclosure Ten Mile					
	Scientific Name	Common Name	Cover	Relative Cover	Avg ht (in)
	n=61				
Total Vegetation Cover			100.0		
Total Ground Cover			100.0		
Grasslike plants					
	<i>Carex nebrascensis</i>	Nebraska Sedge	72.1	72.1	24"
	<i>Juncus balticus</i>	Baltic rush	23.0	23.0	31.8"
Introduced perennial grasses					
	<i>Poa pratensis</i>	Kentucky Bluegrass	4.9	4.9	15.2"

Outside riparian permanent range cage – Tem Mile Pasture

Riparian 10 mile outside	Scientific name	Common name	cover	Rel Cover	Avg height
Total Vegetation Cover			71.0		
Litter			21.0		
Bare Soil			8.0		
Total Ground Cover			92.0		
Cool season perennial grasses					
	<i>Agropyron trachycaulum</i>	Slender Wheatgrass	5.0	7.1	
		<i>Subtotal</i>	5.0	7.1	
Grasslike plants					
	<i>Carex aquatilis</i>	Water sedge	52.0	74.3	5.8"
	<i>Carex nebrascensis</i>	Nebraska Sedge	P	P	
	<i>Juncus balticus</i>	Baltic rush	P	P	
		<i>Subtotal</i>	52.0	74.3	
Introduced perennial grasses					
	<i>Poa pratensis</i>	Kentucky Bluegrass	8.0	11.4	
		<i>Subtotal</i>	8.0	11.4	
Perennial forbs					
	<i>Rumex salicifolius</i>	Willowleaf Dock	P	P	
	<i>Taraxacum officinale</i>	Common Dandelion	2.0	2.9	
		<i>Subtotal</i>	2.0	2.9	
Annual and biennial forbs					
	<i>Chenopodium fremontii</i>	Fremont Goosefoot	P	P	
		<i>Subtotal</i>	P	P	
Shrubs					
	<i>Artemisia tridentata</i>	Big Sagebrush	P	P	
	<i>Chrysothamnus nauseosus</i>	Rubber Rabbitbrush	3.0	4.3	
		<i>Subtotal</i>	3.0	4.3	

P=present, but not intercepted by the pointer

Outside riparian enclosure Ten Mile	n=100	Scientific Name	Common Name	Cover	Relative Cover	Avg ht (in)
Total Vegetation Cover				100.0		
Total Ground Cover				100.0		
Grasslike plants						
		<i>Carex aquatilis</i>	Water sedge	3.0	3.0	18.6"
		<i>Carex nebrascensis</i>	Nebraska Sedge	90.0	90.0	21.7"
		<i>Juncus balticus</i>	Baltic rush	2.0	2.0	17.5"
Introduced perennial grasses						
		<i>Poa pratensis</i>	Kentucky Bluegrass	5.0	5.0	12.2"