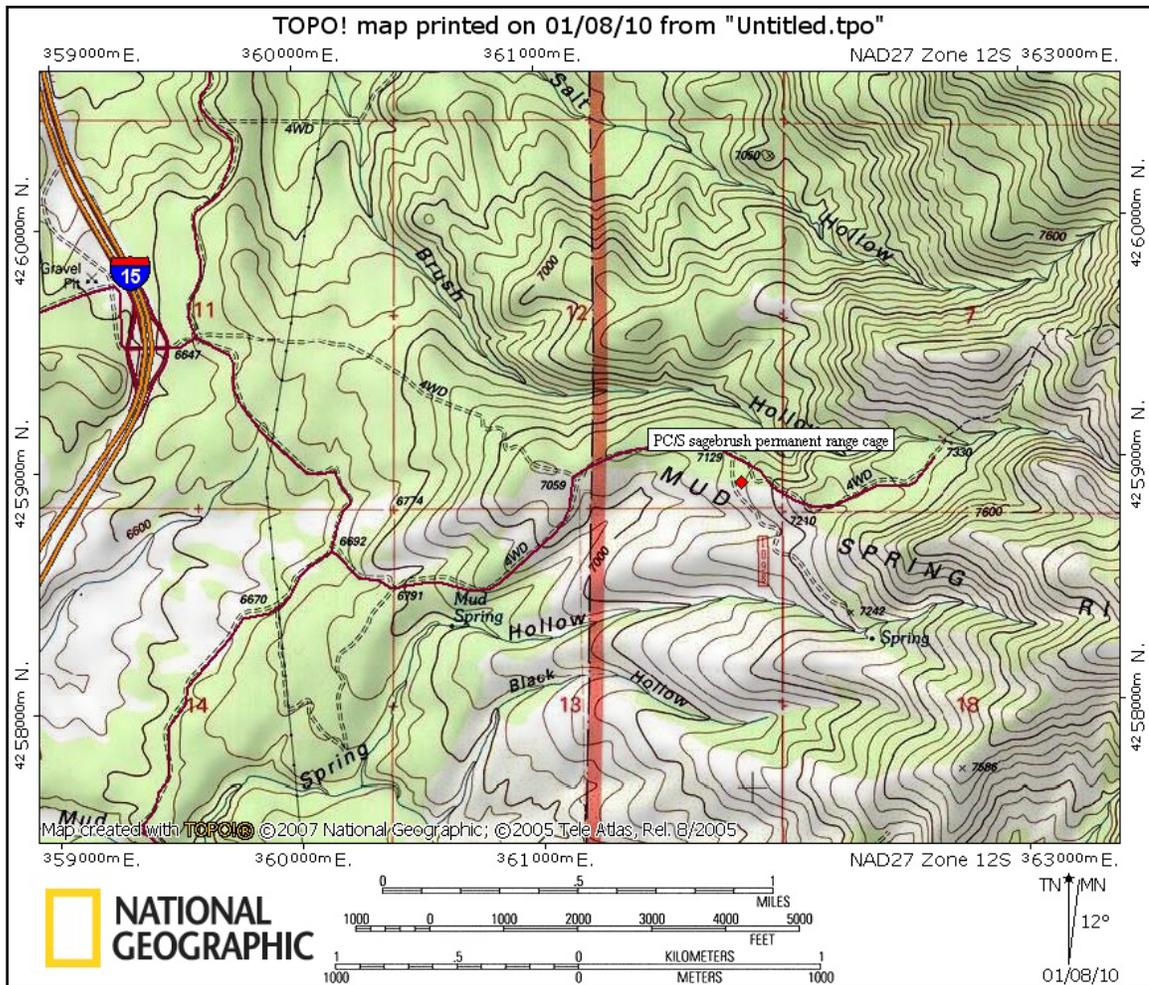


# Pine Creek/Sulphurbeds Allotment

## Sagebrush Permanent Range Cage

Established May 21, 2009

2010 Update



<b>Pine Creek/Sulphurbeds Sagebrush Permanent Range Cage</b>	<b>Established</b> May 21, 2009
Fishlake NF/Beaver RD	<b>Allotment:</b> Pine Creek/Sulphurbeds <b>Pasture:</b> Pine Creek Pasture
<b>Range Cage Location:</b> (NAD CONUS 27)  12N 0361784E 4258906N	Range cage transects: A: S to N, 6 <sup>th</sup> wire from the East B: N to S, wire not recorded.
<b>Aspect:</b> <b>Elevation:</b> 7,150'	<b>Outside Transect</b> 48.5 feet from NW corner of the range cage, running west.
<b>Transect readings:</b> October 12, 2009 surveyors: Hoskisson/O'Brien/Otting <b>September 2, 2010</b> surveyors: Hoskisson/ O'Brien	

This 16' X 16' permanent range cage is located adjacent to FR 1098, a route to a spring on Mud Spring Ridge. The site is north of Wildcat Creek and south of Brush Hollow and south fork Pine Creek in the southwest portion of Pine Creek Pasture.

The Forest Service and Grand Canyon Trust constructed the range cage on May 21, 2009. Grand Canyon Trust photographed the range cage from all corners. No detailed record of all species within the enclosure has been established.

On October 12, 2009, Grand Canyon Trust read two point-intercept transects running N-S across the range cage, recording the height and species or genus of each plant and ground cover every 6" for a total of 60 points.

The outside comparison to this permanent sagebrush range cage is a transect starting 48.5' from the NW corner of the range cage and running 100' west. The height and species or genus of each plant and ground cover intercepted along the transect were read on the transect every 2' were recorded for total of 50 points.



Fig. 1 (10/12/09) Pine Creek/Sulphurbeds sagebrush permanent range cage (background), and 0' of transect



Fig. 2 (05/21/09) SE corner of the sagebrush range cage



Fig. 3 (05/21/09) Ground cover in the range cage looking north from the middle of the south side of the cage.

## Transect Readings

(1) October 12, 2009

(2) September 2, 2010

Of particular interest with a sagebrush range cage is the understory grasses and forbs, over time.

(2009) Grass cover within the range cage was recorded as 17%; 25% outside. The average height of grasses within the range cage was 12"; 6" outside. Sagebrush cover is higher along the transect (35% outside; 19% inside), and bare ground less (10% outside; 17% inside). This site was seeded at some time in the past: exotic crested wheatgrass is present inside and outside; exotic intermediate wheatgrass was encountered on the outside transect. The exotic peppergrass, *Alyssum parviflorum*, is the most common forb encountered.

Similar percent of grass/forb cover was recorded inside and outside the range cage (i.e., 33% inside; 31% outside, despite the higher sagebrush cover outside.

(2010) Cattle were on this pasture from June 16 to August 15 in 2010; the pasture has not yet moved to 30% utilization. Inside the range cage, there was 56% total vegetation cover (including 7% standing dead sagebrush); 7% bare ground, and 27% litter. Native perennial grasses were at 7% cover and an average height of 18" tall (Fig. 10); the introduced pasture grass, crested wheatgrass was 3% cover, 21" tall. Total forb cover was 26% perennial forbs at 18% and annual at 8% (Fig. 11):. The sagebrush was at 13% cover and 37" tall,

Outside the range cage also had 56% total vegetation cover, but bare soil was four times greater at 28% (Figs. 8 and 9; see also Fig. 12). The introduced crested wheatgrass accounted for 16% of the cover at an average 10" in height. Litter was 14% cover, and sagebrush was 26% cover at an average height of 31". Native perennial grasses were 2% cover, less than a third that in the range cage. Total forb cover was less than half that inside the range cage: 12% with perennial forbs 8% cover; stoneseed (*Lithospermum incisum*) was the most common and the annual forb alyssum (*Alyssum minus*) was 4% cover. As

Both in and outside the range cage there were 8 second hits on vegetation, indicating that most vegetation is one layer in this area.

## Understory/Ground Cover

### Sagebrush Range Cage October 12, 2009

Plants:	Cover (%)	# Species	Height (in.) (average)	Two most common species
Sagebrush	19	1	26	<i>Artemisia tridentata</i> subsp. <i>vaseyana</i>
Other Shrub	5	1	13	<i>Tetradymia</i> sp.
<i>Poa pratensis</i>	0	0		
Other Grass	17	5	12	Each at 3 occurrences: <i>Agropyron cristatum</i> , <i>Pseudoregneria spicata</i> , <i>Poa</i> <i>secunda</i>
Grass-like Plant	0	0		
Forb	16	3	2.5	<i>Allysum desertorum</i> , <i>Collinsia</i> <i>parviflora</i>
<b>Totals</b>	26	10		
Non-plant Cover %:	Bare	Rock	Litter	Lichen, moss, biological crust
	17	3	78	0

### Plants intercepted on transects inside enclosure, in order of frequency

<i>Artemisia tridentata</i> subsp. <i>vaseyana</i>	11
<i>Allysum desertorum</i>	4
<i>Agropyron cristatum</i>	3
<i>Poa secunda</i>	3
<i>Pseudoregneria spicata</i>	3
<i>Tetradymia</i> sp.	3
<i>Cirsium</i> sp.	2
<i>Collinsia parviflora</i>	2
<i>Bromus tectorum</i>	1
<i>Lupinus</i> sp.	1

**Sagebrush Range Cage - Inside  
September 2, 2010**

Plants:	Cover (%)	# Species	Height (in.) (average)	Two most common species
Sagebrush	13	1	37	<i>Artemisia tridentata</i> subsp. <i>vaseyana</i>
Crested wheatgrass	3	1	21	<i>Agropyron cristatum</i>
Other Grass	7	4	18	<i>Pseudoregneria spicata</i> , <i>Poa secunda</i> , <i>Achnatherum lettermanii</i> , <i>Elymus elymoides</i>
Annual grass	2	1		<i>Bromus tectorum</i>
Annual Forb	8	3	2.5	<i>Alyssum minus</i> , <i>Cirsium neomexicanum</i>
Perennial Forb	18	3		<i>Lithospermum incisum</i> , <i>Lupinus sericeus</i> , <i>Balsamorhiza sagittata</i>
Standing Dead	6			
<b>Total Cover</b>	<b>56</b>	<b>13</b>		
Ground cover	Bare	Rock/Gravel	Litter	Lichen, moss, biological crust
Ground cover (no overhead plants)	7	10	27	
Total ground cover (includes beneath plants)	9	16	75	

**Plants intercepted on transects inside enclosure (2010),  
in order of frequency**

Mountain big sagebrush	<i>Artemisia tridentata</i> subsp. <i>vaseyana</i>	13%
Stoneseed	<i>Lithospermum incisum</i>	5%
Silky lupine	<i>Lupinus sericeus</i>	5%
Arrow leaf balsamroot	<i>Balsamorhiza sagittata</i>	3%
Crested wheatgrass	<i>Agropyron cristatum</i>	3%
Alyssum	<i>Alyssum minus</i>	3%
Knotweed	<i>Polygonum douglasii</i>	3%
New Mexico thistle	<i>Cirsium neomexicana</i>	3%
Bastard toadflax	<i>Comandra umbellata</i>	2%
Bluebunch wheatgrass	<i>Pseudoregneria spicata</i>	2%
Bottlebrush squirreltail	<i>Elymus elymoides</i>	2%
Sandberg bluegrass	<i>Poa secunda</i>	2%
Letterman's needlegrass	<i>Achnatherum lettermanii</i>	2%

## Outside Transect

October 12, 2009

Plants:	Cover (%)	# Species	Height (in.) (average)	Two most common species
Sagebrush	35	1	29	<i>Artemisia tridentata</i> ssp. <i>tridentata</i>
Other Shrub	2	1	3	<i>Chrysothamnus</i> sp.
<i>Poa pratensis</i>	0	0		
Other Grass	25	6	6	2 occurrences each of <i>Thinopyrum intermedium</i> , <i>Agropyron cristatum</i> , and <i>Poa secunda</i>
Grass-like Plant	0	0		
Forb	6	3	1	<i>Allysum desertorum</i> , annual forb
<b>Totals</b>	<b>57</b>	<b>11</b>		
Non-plant Cover %:	Bare	Rock	Litter	Lichen, moss, biological crust
	10	0	80	0

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

<i>Artemisia tridentata</i> subsp. <i>vaseyana</i>	18
<i>Bromus tectorum</i>	5
<i>Allysum desertorum</i>	2
<i>Poa secunda</i>	2
<i>Pseudoregneria spicata</i>	3
<i>Thinopyrum intermedium</i>	2
Annual forb	1
<i>Balsamorhiza sagittata</i>	1
<i>Chrysothamnus</i> sp.	1
<i>Elymus elymoides</i>	1
Perennial bunchgrass sp.	1

**Outside Transect**  
**September 2, 2010**

Plants:	Cover (%)	# Species	Height (in.) (average)	Two most common species
Sagebrush	26	1	31	<i>Artemisia tridentata</i> subsp. <i>vaseyana</i>
Crested wheatgrass	16	1	10	<i>Agropyron cristatum</i>
Other Grass	2	1		<i>Elymus elymoides</i>
Annual grass	2	1		<i>Bromus tectorum</i>
Annual Forb	4	1	2.5	<i>Alyssum minus</i>
Perennial Forb	8	3		<i>Lithospermum incisum</i> , <i>Lupinus sericeus</i> , <i>Phlox</i> <i>longifolia</i>
<b>Total Cover</b>	56	8		
Ground cover	Bare	Rock/Gravel	Litter	Lichen, moss, biological crust
Ground cover (no overhead plants)	28	2	14	
Total ground cover (includes beneath plants)	41	2	57	

**Plants intercepted on transects inside enclosure (2010),  
in order of frequency**

Mountain big sagebrush	<i>Artemisia tridentata</i> subsp. <i>vaseyana</i>	26%
Crested wheatgrass	<i>Agropyron cristatum</i>	16%
Alyssum	<i>Alyssum minus</i>	4%
Stoneseed	<i>Lithospermum incisum</i>	4%
Silky lupine	<i>Lupinus sericeus</i>	2%
Long leaved phlox	<i>Phlox longifolia</i>	2%
Cheatgrass	<i>Bromus tectorum</i>	2%
Bottlebrush squirreltail	<i>Elymus elymoides</i>	2%



Fig. 4 (10/12/09) Ground cover in the range cage looking north from the middle of the south side of the cage (Compare with Fig. 3, May 21)



Fig. 5. (10/12/09) Transect A inside sagebrush range cage.



Fig. 6 (10/12/09) Outside transect 0' looking west to 100'



Fig. 7 (10/12/09) Stubble height along outside transect.



Fig. 8 (9/02/2010) Inside/outside east side of range cage



Fig. 9 (9/02/2010) Outside transect, at 0' running west toward 100'.



**Fig. 10 (9/02/2010)** Bluebunch wheatgrass inside range cage.



**Fig. 11 (9/02/2010)** Spineless horsebrush (*Tetradymia canescens*) and silky lupine inside range cage.



**Fig. 12 (9/02/2010)** Heavily-grazed ground near utilization cage, in the Vicinity of the range cage

## Appendix A- 2010 cover data in table format

### Inside Transect 2010

Sagebrush Pine Creek Inside		Cover		Avg height
<b>Total Vegetation Cover</b>		50.0		
Litter		26.7		
Gravel		10.0		
Bare Soil		6.7		
<b>Total Ground Cover</b>		93.3		
<b>Standing Dead</b>		6.7		
	Scientific name	common name	Cover	Rel cover
<b>Cool season perennial grasses</b>				
	Agropyron spicatum	Bluebunch Wheatgrass	1.7	3.3
	Elymus elymoides	Bottlebrush Squirreltail	1.7	3.3
	Poa sandbergii	Sandberg Bluegrass	1.7	3.3
	Stipa lettermanii	Letterman's stipa	1.7	3.3
		<i>Subtotal</i>	6.8	13.3
<b>Introduced perennial grasses</b>				
	Agropyron cristatum	Crested Wheatgrass	3.3	6.7
	Agropyron intermedium	Intermediate Wheatgrass	P	P
		<i>Subtotal</i>	3.3	6.7
<b>Annual grasses</b>				
	Bromus tectorum	Cheatgrass	1.7	3.3
		<i>Subtotal</i>	1.7	3.3
<b>Perennial forbs</b>				
	Balsamorhiza sagittata	Arrow leaf balsam root	2.8	3.3
	Calochortus nuttallii	Mariposa Lily	P	P
	Comandra umbellata	Bastard Toadflax	1.7	3.3
	Lithospermum incisum	Narrow leaf Gromwell	5.0	10.0
	Lupinus sericeus	Silky lupine	5.0	10.0
	Phlox longifolia	Long leaved phlox	P	P
	Polygonum douglasii	Knotweed	3.3	6.7
		<i>Subtotal</i>	17.8	33.3
<b>Annual and biennial forbs</b>				
	Alyssum minus	Alyssum	3.3	6.7
	Cirsium neomexicanum	New Mexico thistle	3.3	6.7
	Collomia linearis	Collomia	P	P
	Gayophytum ramosissimum	Groundsmoke	1.7	3.3
	Tragopogon dubius	Salsify	P	P
		<i>Subtotal</i>	8.3	16.7
<b>Shrubs</b>				
	Artemisia tridentata	Big Sagebrush	13.3	26.7
	Tetradymia canescens	Horsebrush	P	P
		<i>Subtotal</i>	13.3	26.7

P=Present, but not intercepted by pointer

8 second hits

### Outside Transect 2010

Sagebrush Pine Creek Outside					
	Scientific Name	Common Name	Cover	Rel Cover	Avg height
<b>Total Vegetation Cover</b>			56.0		
Litter			14.0		
Gravel			2.0		
Bare Soil			28.0		
<b>Total Ground Cover</b>			72.0		
<b>Cool season perennial grasses</b>					
	Elymus elymoides	Bottlebrush Squirreltail	2.0	3.6	
	Poa sandbergii	Sandberg Bluegrass	P	P	
	Stipa lettermanii	Letterman's stipa	P	P	
		<i>Subtotal</i>	2.0	3.6	
<b>Introduced perennial grasses</b>					
	Agropyron cristatum	Crested Wheatgrass	16.0	28.6	10.4"
		<i>Subtotal</i>	16.0	28.6	
<b>Annual grasses</b>					
	Bromus tectorum	Cheatgrass	2.0	3.6	
		<i>Subtotal</i>	2.0	3.6	
<b>Perennial forbs</b>					
	Astragalus mollisimus	Milkvetch	P	P	
	Balsamorhiza sagittata	Arrow leaf balsam root	P	P	
	Calochortus nuttallii	Mariposa Lily	P	P	
	Eriogonum racemosum	Red root buckwheat	P	P	
	Linum lewisii	Common Blue Flax	P	P	
	Lithospermum incisum	Narrowleaf Gromwell	4.0	7.1	
	Lupinus sericeus	Silky lupine	2.0	3.6	
	Phlox longifolia	Long leaved phlox	2.0	3.6	
	Polygonum douglasii	Knotweed	P	P	
		<i>Subtotal</i>	8.0	14.3	
<b>Annual and biennial forbs</b>					
	Allysum minus	Alyssum	4.0	7.1	2.2"
	Collomia linearis	Collomia	P	P	
		<i>Subtotal</i>	4.0	7.1	
<b>Shrubs</b>					
	Artemisia tridentata	Big Sagebrush	26.0	42.9	30.6"
	Quercus gambelli	Gambel's oak	P	P	
	Tetradymia canescens	Horsebrush	P	P	
		<i>Subtotal</i>	26.0	42.9	

P=present, but not intercepted by the pointer  
8 second hits