

Trend Study 22-4-08

Study site name: Wades Canyon .

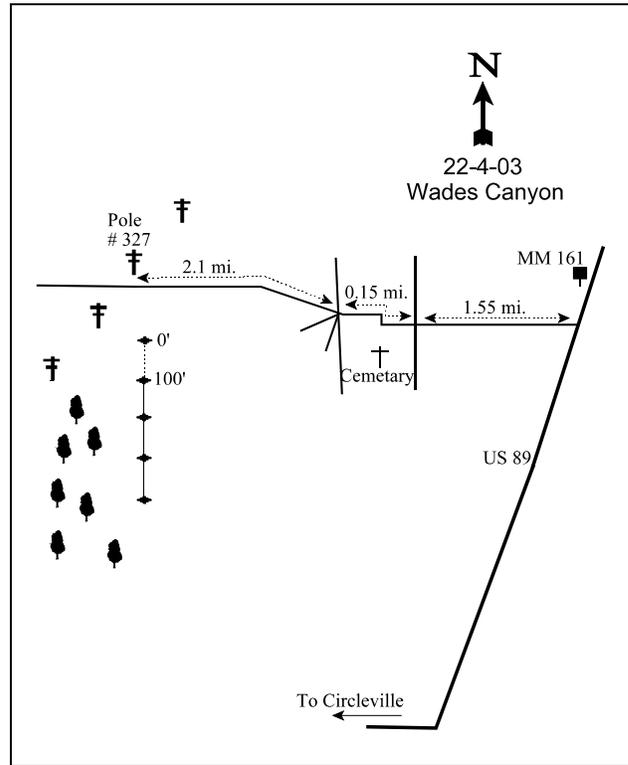
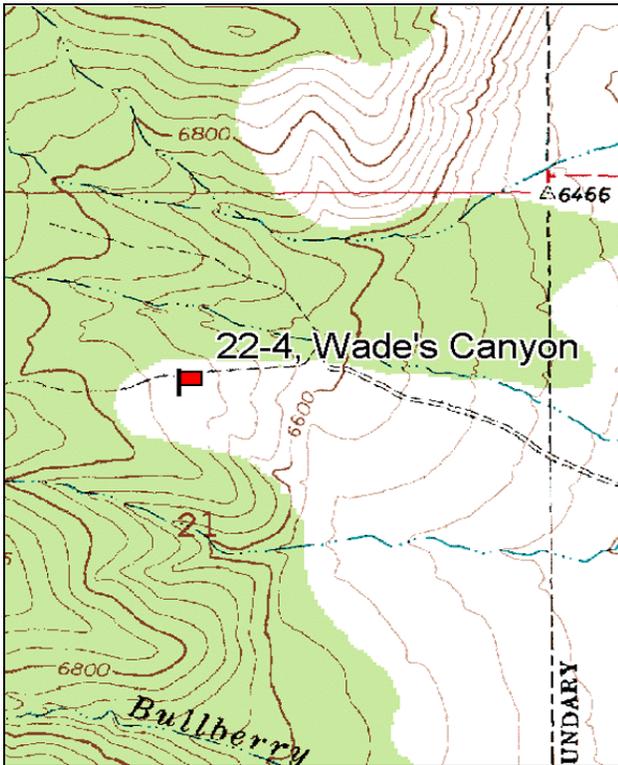
Vegetation type: Big Sagebrush-Grass .

Compass bearing: frequency baseline 180 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From 300 W and Main St in Circleville, go north on 300 W for 0.4 miles to 400 N. Turn west and go 1.55 miles through the north end of Circleville to a jog in the road. Continue west past the jog 0.15 miles to the Circleville cemetery. Drive around the cemetery to the northeast corner. From the corner, a faint road takes off at a 45-degree angle to the northwest. Proceed up this road 2.1 miles to the point where it crosses under a high tension powerline. Stop here. The pole (# 327) nearest the road has a red browse tag #7046 attached under a yellow reflector. Walk 300 feet due south to the first frequency baseline stake. The 0-foot stake is a 2-1/2 foot tall rebar tagged #7045. There is an unmarked pellet group transect here also.



Map Name: Circleville

Diagrammatic Sketch

Township 30S, Range 4W, Section 21

GPS: NAD 83, UTM 12S 384642 E, 4227555 N

## DISCUSSION

### Wades Canyon - Trend Study No. 22-4

#### Study Information

This study is located northwest of Circleville just inside the Forest Service boundary [elevation: 6,700 feet (2,042m), slope: 4-8%, aspect: east]. The vegetation type is sagebrush-grass, but pinyon (*Pinus edulis*) and juniper (*Juniperus osteosperma*) are encroaching. The DWR Wades Canyon pellet group transect located nearby showed that deer use increased from 3 deer days use/acre (8 ddu/ha) in 1976-77 to 17 (42 ddu/ha) in 1980-81, with a 5 year average of 12 days use/acre (30 ddu/ha). Deer use had increased to 31 days use/acre (77 ddu/ha) by 1984-85, with a 5 year average between 1981 and 1985 of 24 deer days use/acre (59 ddu/ha) (Jense et al. 1985). Between 1986 and 1990, the trend continued to increase with an average of 27 deer days use/acre (67 ddu/ha). It appears that 1990 was the last time the permanent pellet group transect was read. A pellet group transect read parallel to both sides of the trend study site in 1998 estimated 42 deer days use/acre (104 ddu/ha) and <1 cow days use/acre (2 cdu/ha). Data in 2003 indicated a large increase of deer on the site with an estimated 154 deer day use/acre (380 ddu/ha). A few elk pellet groups were also sampled. The data in 2008 indicated 119 deer days use/acre (294 ddu/ha) with 15 elk days use/acre (36 edu/ha).

#### Soil

Soils are a loam in texture and have a neutral pH (7.1). Soil depth is moderate with an effective rooting depth of 11 inches. Soil temperature averaged 62°F at a depth of 12 inches in 1998. A dense hardpan is found at a depth of about 10-12 inches. Phosphorous is marginal for plant growth and development, at 8.8 ppm (Tiedemann and Lopez 2004). The water holding capacity is poor. Some soil movement is detectable, but the slope reduces the potential for serious erosion problems. An erosion condition class assessment rated soils as stable to slightly eroding in 2003 and stable in 2008. Rock and pavement are abundant on the soil surface and bare soil was relatively low at 10% in 2003 and 8% in 2008.

#### Browse

Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) is the principal key species. Wyoming big sagebrush provides on average about a half of the browse cover and had a density of 2,920 plants/acre in 1998, 2003, and 2008. The population of Wyoming big sagebrush on this site is stagnant and in poor condition. Seedling and young plants occurred in very low numbers since 1998. The age structure is made up mostly of decadent plants. Decadence has been high at every reading averaging about 50%. Young plants have been rare. Utilization has been light to moderate in most years except for 1991 when most use was classified as heavy use. In 1985, it was reported that sagebrush appeared very chlorotic and in poor health between the Circleville dump and the transect. Periods of drought have also had a definitive negative effect on the health of sagebrush.

Narrowleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *stenophyllus*) is also abundant. Rabbitbrush density has increased since 1998. However, cover has steadily decreased over this same period of time from 8.2% to 5.5%. Height and crown averages have also decreased on this species. This has most likely been caused because of competition for limited resources and moisture. The low rabbitbrush population should be monitored closely in the future as it can negatively affect the sagebrush population. Broom snakeweed (*Gutierrezia sarothrae*) is also found on this site. Density has varied with moisture cycles.

Point-center quarter data estimated 67 pinyon trees/acre in both 2003 and 2008. Utah juniper density was estimated at 58 trees/acre in 2003 and 63 trees/acre in 2008.

#### Herbaceous Understory

The herbaceous understory at Wades Canyon has low diversity. Indian ricegrass (*Oryzopsis hymenoides*) and bottlebrush squirreltail (*Sitanion hystrix*) are the most common grass species. Bottlebrush squirreltail

significantly decreased in abundance in 2003, but significantly increased in 2008. Indian ricegrass cover and nested frequency has been consistent at every reading. Needle-and-thread grass (*Stipa comata*) has a more clumped distribution and was only sampled in one quadrat. Sum of nested frequency for perennial grasses increased the first three readings, but declined by 35% in 2003 with drought conditions, mostly because of losses to bottlebrush squirreltail.

Composition and production of the forb component is poor on this site. No annual forbs were sampled until 2003 when an annual *Gilia* was the most abundant forb on the site, however, it was not sampled in 2008. Tansy mustard (*Descurainia pinnata*) and stickseed (*Lappula occidentalis*) are other annual species sampled in 2003. Hood's phlox (*Phlox hoodii*) was the most abundant perennial forb in 1998, but declined in 2003 and 2008. Sum of nested frequency for perennial forbs declined by 74% between 1998 and 2003. Forb abundance was similar in 2008.

#### 1991 TREND ASSESSMENT

The key browse species is Wyoming big sagebrush. Low rabbitbrush, an increaser, is also abundant. Both species experienced increases in their respective densities, but decadence for sagebrush is high at 47% and vigor is poor. The trend for browse is slightly down. The perennial grass trend is stable. Trend for perennial forbs is a down, due to a decrease in nested frequency of perennial forbs.

browse - slightly down (-1)      grass - stable (0)      forb - down (-2)

#### 1998 TREND ASSESSMENT

The browse trend is slightly down with the health of the Wyoming big sagebrush population continuing to deteriorate. There is an increase in decadence and poor vigor. The grass trend is up because of a substantial increase in sum of nested values (increased by 54%) for perennial species. It should be noted that the site has very low diversity with perennial grass cover composed of only two species, Indian ricegrass and bottlebrush squirreltail. The trend for perennial forbs is slightly down with sum of nested frequency decreasing by 15%.

Winter Range Condition (DCI) - good (48) low potential scale  
browse - slightly down (-1)      grass - up (+2)      forb - slightly down (-1)

#### 2003 TREND ASSESSMENT

Trend for browse is slightly down even though the Wyoming big sagebrush density remains the same. It is slightly down because recruitment continues to be only 5%. Another negative influence is that the two increasers, low rabbitbrush and broom snakeweed, increased in density in 2003. These increasers should be monitored closely for further expansion. The grass trend is slightly down. There was not a significant change in Indian ricegrass, but squirreltail significantly decreased in nested frequency. Bottlebrush squirreltail was the species most affected by the drought conditions. Total cover for perennial grasses was half what it was in 1998. Perennial forb trend is down. Perennial forb nested frequency declined by nearly 75% in 2003 with the biggest loss coming to low fleabane (*Erigeron pumilus*). Annuals are also coming into the site as they were first sampled in 2003.

Winter Range Condition (DCI) - poor-fair (26) low potential scale  
browse - slightly down (-1)      grass - slightly down (-1)      forb - down (-2)

#### 2008 TREND ASSESSMENT

Trend for browse is stable, but in poor condition. Wyoming big sagebrush density has remained similar to 2003, but decadence is high and recruitment is low. Two increasers, low rabbitbrush and broom snakeweed, could increase with any excessive disturbance. These increasers should be monitored closely for further expansion. The grass trend is up as the sum of nested frequency values for perennial species increased by 27%. Bottlebrush squirreltail significantly increased in nested frequency, but Indian ricegrass showed only a

slight increase, yet not a significant increase. Perennial forbs are stable as nested frequency remained nearly the same, however, they occur rarely and contribute to less than 0.3% total cover. Annuals occurred on site in 2003, but none were sampled in 2008.

Winter Range Condition (DCI) - poor (23) low potential scale  
browse - stable (0)                      grass - up (+2)                      forb - stable (0)

HERBACEOUS TRENDS --  
 Management unit 22 , Study no: 4

T y p e	Species	Nested Frequency					Average Cover %		
		'85	'91	'98	'03	'08	'98	'03	'08
G	Bromus tectorum (a)	-	-	1	5	5	.00	.03	.01
G	Oryzopsis hymenoides	138	133	150	144	154	5.26	4.76	5.23
G	Sitanion hystrix	<sub>a</sub> 63	<sub>ab</sub> 84	<sub>c</sub> 184	<sub>a</sub> 74	<sub>b</sub> 120	7.67	.59	2.06
G	Stipa comata	-	-	-	-	3	-	-	.15
Total for Annual Grasses		0	0	1	5	5	0.00	0.03	0.01
Total for Perennial Grasses		201	217	334	218	277	12.94	5.36	7.44
Total for Grasses		201	217	335	223	282	12.94	5.39	7.46
F	Arabis sp.	-	4	-	-	-	-	-	-
F	Astragalus calycosus	<sub>b</sub> 46	<sub>b</sub> 62	<sub>a</sub> 12	<sub>a</sub> 2	<sub>a</sub> 16	.08	.00	.03
F	Castilleja chromosa	<sub>b</sub> 15	<sub>a</sub> -	<sub>a</sub> -	<sub>a</sub> -	<sub>a</sub> -	-	-	-
F	Chaenactis douglasii	<sub>c</sub> 28	<sub>b</sub> 9	<sub>a</sub> 3	<sub>a</sub> -	<sub>a</sub> -	.00	-	-
F	Delphinium occidentale	-	-	-	1	-	-	.00	-
F	Descurainia pinnata (a)	-	-	<sub>a</sub> -	<sub>b</sub> 57	<sub>a</sub> -	-	.28	-
F	Erigeron pumilus	<sub>c</sub> 150	<sub>b</sub> 95	<sub>bc</sub> 118	<sub>a</sub> 2	<sub>a</sub> 18	1.21	.01	.07
F	Eriogonum racemosum	-	-	-	-	7	-	-	.01
F	Gilia sp. (a)	-	-	<sub>a</sub> -	<sub>b</sub> 209	<sub>a</sub> -	-	1.75	-
F	Lappula occidentalis (a)	-	-	<sub>a</sub> -	<sub>b</sub> 13	<sub>a</sub> -	-	.14	-
F	Mentzelia sp.	<sub>a</sub> -	<sub>a</sub> -	<sub>a</sub> -	<sub>b</sub> 12	<sub>a</sub> 2	-	.07	.00
F	Physaria chambersii	<sub>b</sub> 36	<sub>b</sub> 21	<sub>b</sub> 32	<sub>a</sub> -	<sub>a</sub> 3	.10	-	.00
F	Phlox hoodii	<sub>bc</sub> 72	<sub>c</sub> 99	<sub>bc</sub> 82	<sub>ab</sub> 48	<sub>a</sub> 21	2.44	.53	.16
F	Thlaspi montanum	<sub>b</sub> 19	<sub>a</sub> -	<sub>a</sub> -	<sub>a</sub> -	<sub>a</sub> -	-	-	-
F	Unknown forb-perennial	1	-	-	-	-	-	-	-
Total for Annual Forbs		0	0	0	279	0	0	2.18	0
Total for Perennial Forbs		367	290	247	65	67	3.84	0.63	0.28
Total for Forbs		367	290	247	344	67	3.84	2.81	0.28

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --

Management unit 22 , Study no: 4

Type	Species	Strip Frequency			Average Cover %		
		'98	'03	'08	'98	'03	'08
B	Artemisia tridentata wyomingensis	76	74	73	11.38	8.52	6.50
B	Chrysothamnus viscidiflorus stenophyllus	73	80	77	8.23	7.46	5.51
B	Gutierrezia sarothrae	36	49	50	.79	.68	.38
B	Juniperus osteosperma	2	3	2	.78	2.00	1.48
B	Opuntia sp.	2	4	3	.03	.03	.06
B	Pinus edulis	2	3	4	.63	.00	.03
Total for Browse		191	213	209	21.85	18.71	13.97

CANOPY COVER, LINE INTERCEPT --

Management unit 22 , Study no: 4

Species	Percent Cover		
	'98	'03	'08
Artemisia tridentata wyomingensis	-	6.21	8.80
Chrysothamnus viscidiflorus stenophyllus	-	8.13	7.25
Gutierrezia sarothrae	-	.06	.86
Juniperus osteosperma	-	2.16	2.40
Pinus edulis	1.20	1.20	.26

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 22 , Study no: 4

Species	Average leader growth (in)	
	'03	'08
Artemisia tridentata wyomingensis	1.6	1.4

POINT-QUARTER TREE DATA --

Management unit 22 , Study no: 4

Species	Trees per Acre		
	'98	'03	'08
Juniperus osteosperma	47	58	63
Pinus edulis	58	67	67

Average diameter (in)		
'98	'03	'08
5.1	3.8	4.0
4.7	2.7	2.2

**BASIC COVER --**

Management unit 22 , Study no: 4

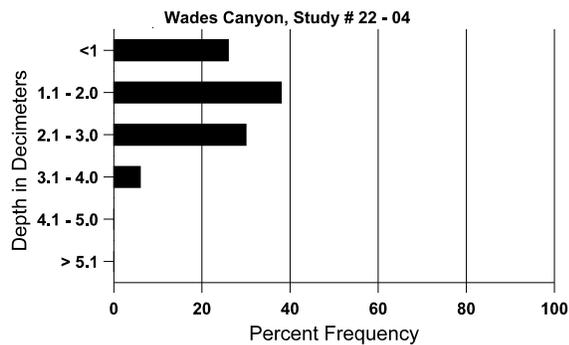
Cover Type	Average Cover %				
	'85	'91	'98	'03	'08
Vegetation	6.25	5.25	34.92	27.25	24.67
Rock	21.25	17.75	17.62	16.10	12.13
Pavement	39.75	41.50	30.56	24.55	33.63
Litter	25.00	17.25	26.46	26.49	29.25
Cryptogams	.25	4.75	2.44	4.17	3.34
Bare Ground	7.50	13.50	6.94	11.24	8.40

**SOIL ANALYSIS DATA --**

Management unit 22, Study no: 4, Study Name: Wades Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	loam			%OM	PPM P	PPM K	ds/m
			%sand	%silt	%clay				
11.0	62.0 (12.2)	7.1	42.0	31.4	26.6	3.0	8.8	96.0	0.7

**Stoniness Index**



**PELLET GROUP DATA --**

Management unit 22 , Study no: 4

Type	Quadrat Frequency		
	'98	'03	'08
Rabbit	18	10	92
Elk	-	2	10
Deer	24	31	63

Days use per acre (ha)		
'98	'03	'08
-	-	-
-	3 (8)	14 (36)
42 (104)	154 (380)	119 (294)

BROWSE CHARACTERISTICS --  
Management unit 22 , Study no: 4

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia tridentata wyomingensis</i>												
85	<b>4598</b>	66	666	2199	1733	-	58	20	38	-	6	20/24
91	<b>5399</b>	-	733	2133	2533	-	27	62	47	9	31	17/22
98	<b>2920</b>	60	240	900	1780	1000	26	4	61	41	64	19/27
03	<b>2920</b>	-	140	1400	1380	920	55	11	47	21	21	19/24
08	<b>2940</b>	20	120	1100	1720	980	37	22	59	31	33	16/24
<i>Chrysothamnus viscidiflorus stenophyllus</i>												
85	<b>7198</b>	-	1199	4933	1066	-	12	0	15	-	0	10/10
91	<b>8264</b>	-	399	6399	1466	-	23	61	18	1	5	8/9
98	<b>4840</b>	-	360	4240	240	40	1	0	5	.82	2	12/16
03	<b>5860</b>	-	40	5700	120	180	0	0	2	.34	.34	13/16
08	<b>6140</b>	-	80	3400	2660	220	40	.97	43	7	7	9/13
<i>Gutierrezia sarothrae</i>												
85	<b>199</b>	-	-	199	-	-	0	0	0	-	0	8/5
91	<b>333</b>	-	-	333	-	-	0	20	0	-	0	7/6
98	<b>1680</b>	-	340	1280	60	80	0	0	4	2	4	8/9
03	<b>6020</b>	-	4820	1080	120	40	0	0	2	.99	.99	7/6
08	<b>2100</b>	420	340	1440	320	980	3	0	15	12	12	6/7
<i>Juniperus osteosperma</i>												
85	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
91	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
98	<b>40</b>	-	20	20	-	-	0	0	0	-	0	-/-
03	<b>60</b>	-	-	60	-	-	0	0	0	-	0	-/-
08	<b>40</b>	-	-	20	20	-	0	0	50	-	0	-/-
<i>Opuntia sp.</i>												
85	<b>265</b>	-	66	199	-	-	0	0	-	-	75	5/3
91	<b>133</b>	-	-	133	-	-	0	0	-	-	0	5/9
98	<b>40</b>	-	-	40	-	-	0	0	-	-	0	5/11
03	<b>80</b>	-	-	80	-	-	0	0	-	-	0	4/9
08	<b>60</b>	-	-	60	-	-	0	0	-	-	0	5/9

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<b>Pediocactus simpsonii</b>												
85	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
91	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
98	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
03	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
08	<b>0</b>	-	-	-	-	-	0	0	-	-	0	3/3
<b>Pinus edulis</b>												
85	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
91	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
98	<b>40</b>	-	-	40	-	-	0	0	-	-	0	-/-
03	<b>60</b>	-	40	20	-	-	0	0	-	-	0	-/-
08	<b>80</b>	-	60	20	-	-	0	0	-	-	0	-/-