

Trend Study 29R-1-08

Study site name: Elephant Gap Total Enclosure.

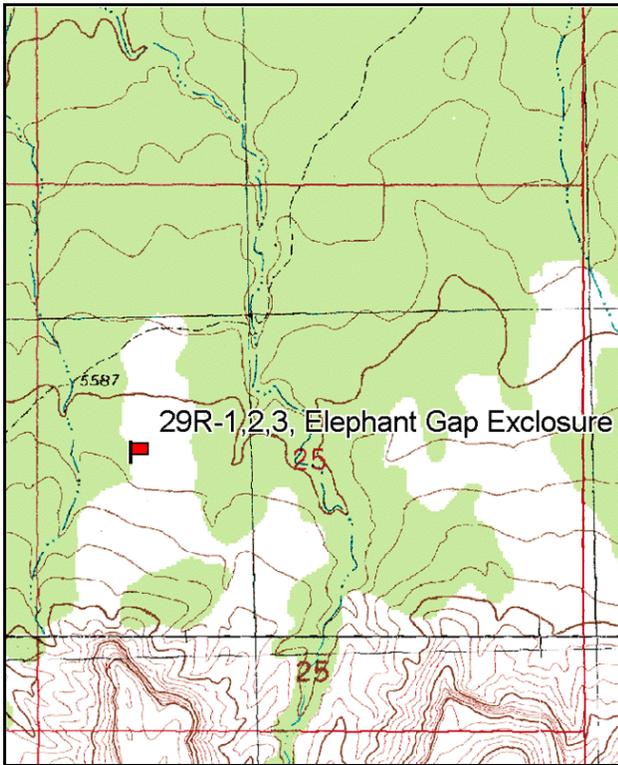
Vegetation type: Pinyon-Juniper .

Compass bearing: frequency baseline 50 degrees magnetic.

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

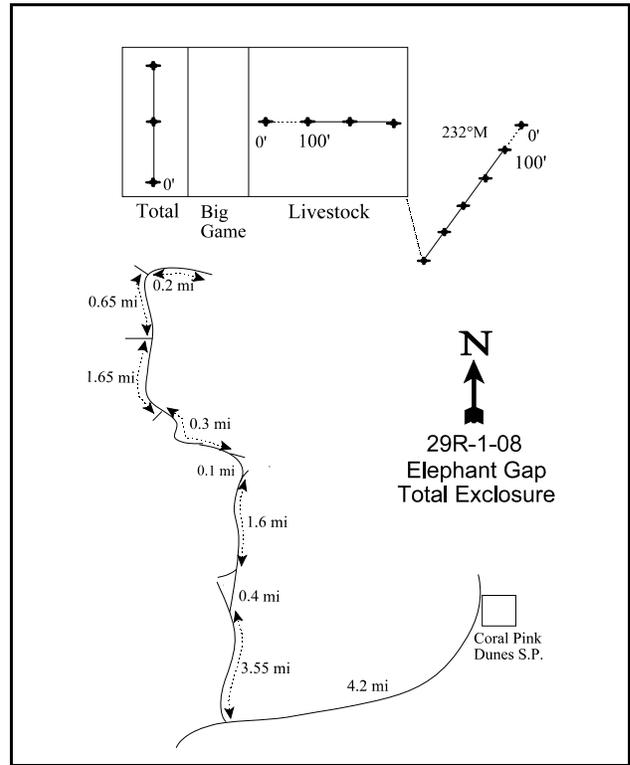
LOCATION DESCRIPTION

The starting point for this site is the entry to Coral Pink Sand Dunes State Park off of Hwy 89. From the entry of the park, travel south for 4.2 miles. Turn right and go 3.55 miles to a fork. Stay right and continue 2.7 miles to a cattleguard. Continue on main road for another 0.65 miles to another cattleguard. Drive another 1.85 miles to a faint road to the right (south). Drive on this road for 0.2 miles to the enclosure. The total enclosure is nearest to the road and the baseline (200 feet long) runs through the middle at 50 degrees magnetic. The 0 foot stake is marked by browse tag #116.



Map Name: The Barracks

Township 42S, Range 9W, Section 25



Diagrammatic Sketch

GPS: NAD 83, UTM 12S 339577 E, 4110770 N

## DISCUSSION

### Elephant Gap Total Exclosure - Trend Study No. 29R-1

#### Study information

This study was established in 1998 inside the total exclosure at Elephant Gap [elevation: 5,600 feet (1,707 m), slope: 6%, aspect: north to northwest]. The Elephant Gap exclosure complex is located about 16 miles west-northwest of Kanab and about 9 miles northwest of the Coral Pink Sand Dunes State Park. The exclosure was built in the 1960's just north of Harris Point, and the total exclosure is approximately 100 feet by 200 feet in size. The area supports a moderately dense stand of pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees with a mixture of basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*), bitterbrush (*Purshia tridentata*), and serviceberry (*Amelanchier utahensis*) in the understory. The exclosure is in need of repair. In 2008, a deer carcass and deer pellets were found inside the exclosure. Pellet group data from 2008 estimated 3 deer days use/acre (8 ddu/ha).

#### Soils

Soil at the site is very deep with an effective rooting depth estimated at over 31 inches. Texture is sandy and reactivity is slightly acidic (6.2 pH). Phosphorus and potassium have low availability for plant growth and development at just 5.6 ppm and 12.8 ppm, respectively (Tiedemann and Lopez 2004). There is virtually no rock or pavement on the surface or within the profile. A considerable amount of bare ground was estimated in both surveys, but there is little erosion occurring due to the gentle slope and the rapid infiltration capacity of the soil. The soil erosion condition was classified as stable in 2008.

#### Browse

Basin big sagebrush and bitterbrush are the key browse species. They combined to provide 48% and 41% of the shrub cover in 1998 and 2003, respectively, but only 33% of shrub cover in 2008. Density of basin big sagebrush was estimated at 1,280 plants/acre in 1998, decreasing to 760 plants/acre in 2003, then rising to 880 plants/acre in 2008. Decadence was moderately low in 1998 at 19%, but increased to 53% in 2003, and 55% in 2008. In 2008, there were only about 200 bitterbrush plants/acre inside the total exclosure with half being mature and half decadent. No young bitterbrush were sampled in any of the surveys. Small numbers of sand sagebrush (*Artemisia filifolia*), rubber rabbitbrush (*Chrysothamnus nauseosus hololeucus*), green ephedra (*Ephedra viridis*), coin buckwheat (*Eriogonum nummularre*), and yucca (*Yucca sp.*) were found inside of the exclosure. There were a few small pinyon pine and large Utah juniper trees inside of the total exclosure. Average basal diameter was approximately 14 inches for juniper and 4 inches for pinyon, juniper canopy cover was estimated at 12% in 1998 and 19% in 2003 and 2008.

#### Herbaceous understory

The herbaceous understory is very poor on the site. Total herbaceous cover was estimated at only 6% in 1998, 3% in 2003, and 4% in 2008. The most common perennial grasses were blue grama (*Bouteloa gracilis*) and sand dropseed (*Sporobolus cryptandrus*), both warm season species. They accounted for 93% of the grass cover in 1998 and 66% in 2008. With the exception of milkvetch (*Astragalus sp.*), most of the herbaceous species on the site declined in 2003 with drought. There was an improvement in herbaceous cover, although it is still low overall. There are few annual species on the site.

#### 1998 DESIRABLE COMPONENTS INDEX

Winter range condition (DCI) - poor (40) Mid-level potential scale

#### 2003 TREND ASSESSMENT

Trend for browse is down. Basin big sagebrush and bitterbrush had reduced population densities and increased decadence. The sagebrush population displayed poor vigor. Trends for grasses and forbs were down. Perennial grasses and forbs have lower sum of nested frequency values in 2003. The most abundant

grasses, blue grama and sand dropseed, both significantly declined in nested frequency in 2003. Nested frequency of milkvetch remained similar to 2003, while pale evening primrose (*Oenothera pallida*) significantly declined.

Winter range condition - very poor (24) Mid-level potential scale  
browse - down (-2)                      grasses - down (-2)                      forbs - down (-2)

2008 TREND ASSESSMENT

Browse trend is stable. Basin big sagebrush density increased 16% to 880 plants/acre. No seedlings were found but young plants were estimated at 140 plants/acre (16% of population). Bitterbrush density was the same as 2003 with an estimated 200 plants/acre with 50% decadence and no young or seedlings sampled. Grass trend is slightly up and forbs are stable. Herbaceous understory has increased in cover and sum of nested frequency since 2003. Perennial grass sum of nested frequency was up 51% and cover was up nearly three-fold. Forbs remained stable overall but perennial species provided more cover while annual species declined.

Winter range condition (DCI) - very poor (20) Mid-level potential scale  
browse - stable (0)                      grasses - slightly up (+1)                      forbs - stable (0)

HERBACEOUS TRENDS --  
Management unit 29R, Study no: 1

T y p e	Species	Nested Frequency			Average Cover %		
		'98	'03	'08	'98	'03	'08
G	Bouteloua gracilis	51	38	56	1.21	.22	1.16
G	Bromus tectorum (a)	4	-	2	.01	-	.01
G	Muhlenbergia pungens	2	2	4	.03	.00	.03
G	Oryzopsis hymenoides	2	3	5	.03	.16	.00
G	Sitanion hystrix	-	3	4	-	.00	.01
G	Sporobolus cryptandrus	<sub>b</sub> 39	<sub>a</sub> 5	<sub>a</sub> 8	.77	.07	.01
G	Stipa comata	5	4	6	.00	.15	.53
G	Vulpia octoflora (a)	<sub>b</sub> 20	<sub>a</sub> -	<sub>a</sub> 8	.09	-	.02
Total for Annual Grasses		24	0	10	0.10	0	0.02
Total for Perennial Grasses		99	55	83	2.04	0.62	1.75
Total for Grasses		123	55	93	2.15	0.62	1.77
F	Amaranthus graecizans	-	-	3	-	-	.15
F	Artemisia dracunculus	5	-	-	.01	.03	-
F	Arenaria sp.	-	1	-	-	.03	-
F	Astragalus sp.	60	52	69	1.92	1.57	2.08
F	Descurainia pinnata (a)	7	4	12	.16	.00	.03
F	Dithyrea wislizenii (a)	10	-	-	.27	-	-
F	Eriogonum cernuum (a)	9	-	-	.02	-	-
F	Gilia sp. (a)	<sub>a</sub> 6	<sub>b</sub> 19	<sub>a</sub> 2	.03	.32	.00

T y p e	Species	Nested Frequency			Average Cover %		
		'98	'03	'08	'98	'03	'08
F	Lappula occidentalis (a)	<sub>a</sub> 3	<sub>a</sub> -	<sub>b</sub> 14	.03	-	.03
F	Oenothera albicaulis (a)	-	1	-	-	.00	-
F	Oenothera pallida	<sub>c</sub> 43	<sub>b</sub> 16	<sub>a</sub> -	1.06	.05	-
F	Unknown forb-perennial	-	-	2	-	-	.03
Total for Annual Forbs		35	24	28	0.52	0.32	0.06
Total for Perennial Forbs		108	69	74	3.00	1.69	2.26
Total for Forbs		143	93	102	3.52	2.02	2.33

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

#### BROWSE TRENDS --

Management unit 29R, Study no: 1

T y p e	Species	Strip Frequency			Average Cover %		
		'98	'03	'08	'98	'03	'08
B	Artemisia filifolia	15	12	12	.62	.73	.87
B	Artemisia tridentata tridentata	37	33	34	6.46	5.61	2.71
B	Chrysothamnus nauseosus hololeucus	9	6	10	1.19	1.93	1.41
B	Ephedra viridis	6	5	7	.56	.57	.66
B	Eriogonum nummularre	5	5	6	.33	.15	.00
B	Juniperus osteosperma	1	2	2	7.94	9.25	9.05
B	Opuntia sp.	1	5	4	.03	.00	.00
B	Purshia tridentata	9	9	8	3.56	4.09	3.59
B	Rhus trilobata	1	0	0	.00	-	-
B	Tetradymia canescens	0	1	0	-	.00	-
B	Yucca sp.	3	5	6	.16	1.34	.71
Total for Browse		87	83	89	20.88	23.71	19.01

CANOPY COVER, LINE INTERCEPT --  
 Management unit 29R, Study no: 1

Species		
	'03	'08
Artemisia filifolia	1.13	2.88
Artemisia tridentata tridentata	3.71	4.93
Chrysothamnus nauseosus hololeucus	1.75	1.91
Ephedra viridis	1.13	2.86
Eriogonum nummulare	.38	1.14
Juniperus osteosperma	18.54	19.61
Opuntia sp.	.01	-
Purshia tridentata	4.34	4.43
Yucca sp.	1.06	2.11

KEY BROWSE ANNUAL LEADER GROWTH --  
 Management unit 29R, Study no: 1

Species	Average leader growth (in)	
	'03	'08
Artemisia tridentata tridentata	1.9	1.5
Purshia tridentata	3.5	0.7

BASIC COVER --  
 Management unit 29R, Study no: 1

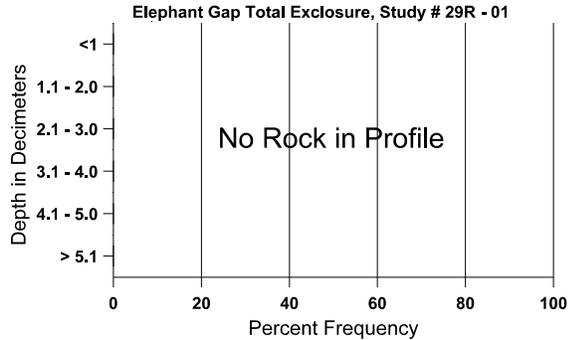
Cover Type	Average Cover %		
	'98	'03	'08
Vegetation	28.10	25.73	24.84
Rock	0	.00	0
Pavement	0	.01	.02
Litter	44.43	51.48	54.87
Cryptogams	5.10	2.59	1.03
Bare Ground	38.44	41.14	38.72

SOIL ANALYSIS DATA --

Management unit 29R, Study no: 1, Study Name: Elephant Gap Total Exclosure

Effective rooting depth (in)	Temp °F (depth)	pH	sand			%OM	PPM P	PPM K	ds/m
			%sand	%silt	%clay				
31.4	68.0 (18.0)	6.2	90.7	4.7	4.6	0.6	5.6	12.8	0.3

Stoniness Index



PELLET GROUP DATA --

Management unit 29R, Study no: 1

Type	Quadrat Frequency		
	'98	'03	'08
Rabbit	2	22	81
Deer	1	9	13

Days use per acre (ha)		
'98	'03	'08
-	-	-
-	-	3 (8)

BROWSE CHARACTERISTICS --

Management unit 29R, Study no: 1

		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>Artemisia filifolia</b>												
98	<b>380</b>	-	120	260	-	20	0	0	0	-	0	24/63
03	<b>280</b>	-	20	120	140	40	0	0	50	7	7	23/25
08	<b>240</b>	-	20	160	60	40	0	0	25	-	0	30/31
<b>Artemisia tridentata tridentata</b>												
98	<b>1280</b>	120	220	820	240	560	0	0	19	13	13	35/45
03	<b>760</b>	-	80	280	400	960	0	0	53	50	50	31/33
08	<b>880</b>	-	140	260	480	820	7	5	55	36	39	39/40

		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>Chrysothamnus nauseosus hololeucus</i>												
98	2400	-	-	2400	-	40	0	0	0	-	0	41/81
03	120	-	-	40	80	60	0	0	67	33	33	36/55
08	320	-	140	20	160	20	0	0	50	25	25	33/44
<i>Ephedra viridis</i>												
98	160	-	40	60	60	-	0	0	38	-	0	28/26
03	100	-	-	100	-	-	0	0	0	-	0	29/32
08	160	-	-	80	80	120	0	13	50	-	0	31/33
<i>Eriogonum nummulare</i>												
98	120	-	40	80	-	-	0	0	0	-	0	22/23
03	140	-	-	100	40	40	0	0	29	14	14	17/19
08	160	-	-	20	140	-	50	0	88	-	0	23/20
<i>Juniperus osteosperma</i>												
98	20	-	20	-	-	-	0	0	-	-	0	-/-
03	40	-	-	40	-	-	0	0	-	-	0	-/-
08	40	-	-	40	-	-	0	0	-	-	0	-/-
<i>Opuntia sp.</i>												
98	20	-	-	-	20	-	0	0	100	-	0	4/14
03	100	-	-	80	20	-	0	0	20	20	20	5/16
08	80	-	-	40	40	-	25	0	50	-	50	3/9
<i>Purshia tridentata</i>												
98	240	-	-	220	20	40	0	0	8	8	8	48/64
03	200	-	-	140	60	100	20	10	30	10	10	48/92
08	200	-	-	100	100	100	0	10	50	20	20	45/77
<i>Quercus gambelii</i>												
98	0	-	-	-	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	-/-
08	0	-	-	-	-	-	0	0	-	-	0	39/31
<i>Rhus trilobata</i>												
98	20	-	-	20	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	-/-
08	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Ribes sp.</i>												
98	0	-	-	-	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	111/104
08	0	-	-	-	-	-	0	0	-	-	0	-/-

		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>Tetradymia canescens</i>													
98	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-	
03	<b>20</b>	-	-	20	-	-	0	0	-	-	0	34/42	
08	<b>0</b>	-	-	-	-	-	0	0	-	-	0	36/47	
<i>Yucca sp.</i>													
98	<b>60</b>	-	-	60	-	-	0	0	0	-	0	33/42	
03	<b>180</b>	-	20	160	-	-	0	0	0	-	0	27/33	
08	<b>280</b>	-	60	120	100	20	7	0	36	21	29	25/35	