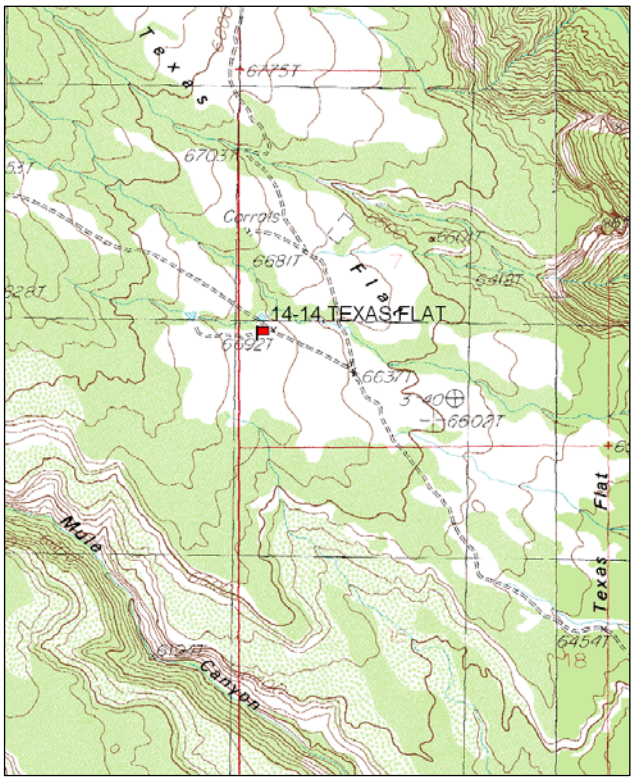
TEXAS FLAT - TREND STUDY NO. 14-14-09

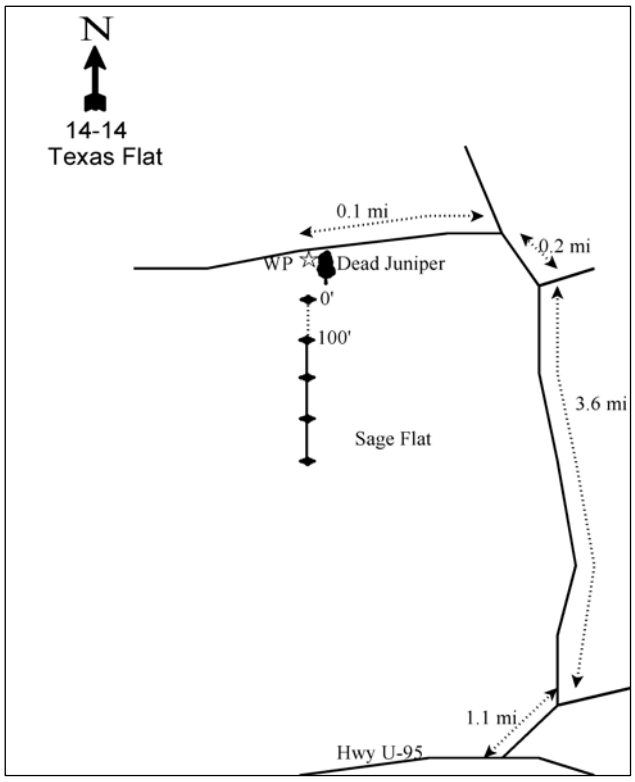
Vegetation Type: Basin Big Sagebrush
Range Type: Crucial Deer Spring/Fall, Crucial Elk Winter
NRCS Ecological Site Description: Upland Loam (Basin Big Sagebrush), R035XY306UT
Land Ownership: BLM
Elevation: 6,700 ft (2,042 m)
Aspect: Southeast
Slope: 2%
Transect bearing: 164 degrees magnetic.
Belt placement: line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft)

Directions:
Turn north off of Highway U-95 onto San Juan County Road #263 at a point 0.3 miles east of mile marker 102. Proceed north 1.1 miles to a fork. Take the left fork. Go another 3.6 miles and turn left. Go down this road 0.2 miles. Turn left onto a faint two-track road and go 0.1 miles to a witness post located just west of an old dead juniper. The witness post is a 3 1/2 foot tall green fence post on the south (left) side of the road. The 0-foot baseline stake is 100 feet south and is a fence post tagged #7868.

Map Name: Hotel Rock



Diagrammatic Sketch:



Township: 37S, Range: 20E, Section: 7

GPS: NAD 83, UTM 12S 609032 E 4160119 N

TEXAS FLAT - TREND STUDY NO. 14-14

Site Information

Site Description: The study is located on Texas Flat, a large flat south of Elk Ridge, surrounded by deep slickrock canyons. Dense pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) stands are intermixed with large basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) parks. In 1955, the sagebrush was railed and drill-seeded with crested wheatgrass (*Agropyron cristatum*). In October 1986, the area was treated with the herbicide tebuthiuron, a soil activated herbicide that defoliates and eventually kills broad leafed plants. The herbicide treatment was planned to leave edges and drainages for wildlife. The study site is close to the edge of the pinyon-juniper, so it is unknown how much herbicide was actually applied. Historically, the Texas Flat pellet group transect in the area showed the average use by deer to be light from 1982 to 1986 (Jense et al. 1987), from 1987 to 1992 (Jense et al. 1992), and from 1993 and 1997 (Hodson et al. 2000). Pellet group data from the site has also indicated light use by deer and elk since 1999. Estimated cattle use was moderate in 1999 and 2004, but decreased to light use in 2009 (Table - Pellet Group Data).

Browse: The density of basin big sagebrush decreased substantially after the herbicide treatment in the fall of 1986. Some of the decrease in density may be related to the larger sample area used in 1992 since there was no increase in the number of decadent or dead plants sampled between 1986 and 1992. After the treatment, the population was mostly mature with limited recruitment of young sagebrush plants from 1992 to 2004, but recruitment increased substantially in 2009. Health of the sagebrush population has been mostly good with good vigor and decadence over the sample years, though decadence was fairly high in 2004. Utilization of sagebrush has been mostly light with some moderate use over the sample years. Sagebrush also displayed some heavy use in 2004. Other browse species sampled include stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *stenophyllus*), white rabbitbrush (*C. nauseosus* ssp. *albicaulis*), slenderbush eriogonum (*Eriogonum microthecum*), and broom snakeweed (*Gutierrezia sarothrae*). White rabbitbrush and slenderbush eriogonum occur in low densities and have received moderate to heavy use in past sample years (Table - Browse Characteristics).

Herbaceous Understory: Perennial grasses provide the dominant vegetation component on the site. Almost all of the grass cover is provided by two species, crested wheatgrass and sand dropseed (*Sporobolus cryptandrus*). Initially after the treatment, sand dropseed increased in nested frequency, but has decreased on the site since 1992. Crested wheatgrass has remained relatively similar over the years and was the dominant species on the site in 2009. Forbs were scarce before the treatment and they increased substantially in 1992, after the treatment, however the sum of nested frequency for perennial forbs declined dramatically by 1994 and has remained at a low level since. Common species have included low fleabane (*Erigeron pumilus*), thickleaf peavine (*Lathyrus lanszwertii*), and scarlet globemallow (*Sphaeralcea coccinea*) (Table - Herbaceous Trends).

Soil: Soil on the site is a sandy loam with a neutral pH and a very compact soil with a moderately deep effective rooting depth (Table - Soil Analysis Data). The parent material is sandstone. Bare ground cover was low from 1992 to 1999, but increased substantially in 2004 and remained high in 2009 (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1986 to 1992 - down (-2):** The density of the primary browse species, basin big sagebrush, decreased by 97% from 5,465 plants/acre to 180 plants/acre. The differences in density may be related to the larger sample area used in 1992, but with the herbicide treatment after the 1986 sampling likely reflects a true trend. The recruitment of young and seedling sagebrush plants also decreased substantially.

- **1992 to 1994 - slightly up (+1):** The density of sagebrush increased to 500 plants/acre and cover increased from less than 1% to 2%. However, plants displaying poor vigor increased to 16% and the recruitment of young plants remained low.
- **1994 to 1999 - stable (0):** There was no change in the density of sagebrush, though cover decreased to less than 1%. Sagebrush plants displaying poor vigor decreased to 4%.
- **1999 to 2004 - stable (0):** There was slight increase in the density of sagebrush to 540 plants/acre, though cover is still less than 1%. Decadence of sagebrush increased from 12% to 30% and poor vigor increased to 11%. White rabbitbrush was sampled for the first time in the density strips.
- **2004 to 2009 - up (+2):** The density of sagebrush more than tripled to 1,700 plants/acre and cover increased to 3%. Recruitment of young sagebrush plants contributed to the large increase in density and comprised 40% of the population. Decadence and poor vigor of sagebrush both decreased.

Grass:

- **1986 to 1992 - up (+2):** The sum of nested frequency of perennial grasses increased by 54% with a significant increase in the nested frequency of sand dropseed. There was a significant decrease in the nested frequency of needle-and-thread.
- **1992 to 1994 - stable (0):** There was little change in the sum of nested frequency of perennial grasses though cover decreased from 33% to 23%. There was a significant increase in the nested frequency of sand dropseed.
- **1994 to 1999 - slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 10% and cover decreased to 17%. There was a significant decrease in the nested frequency of sand dropseed.
- **1999 to 2004 - slightly down (-1):** There was a 19% decrease in the sum of nested frequency of perennial grasses and cover decreased to 13%. There was a significant decrease in the nested frequency of crested wheatgrass.
- **2004 to 2009 - stable (0):** There was a slight increase in the sum of nested frequency of perennial grasses and cover increased to 18%. There was a significant increase in the nested frequency of crested wheatgrass, but sand dropseed decreased significantly in nested frequency.

Forb:

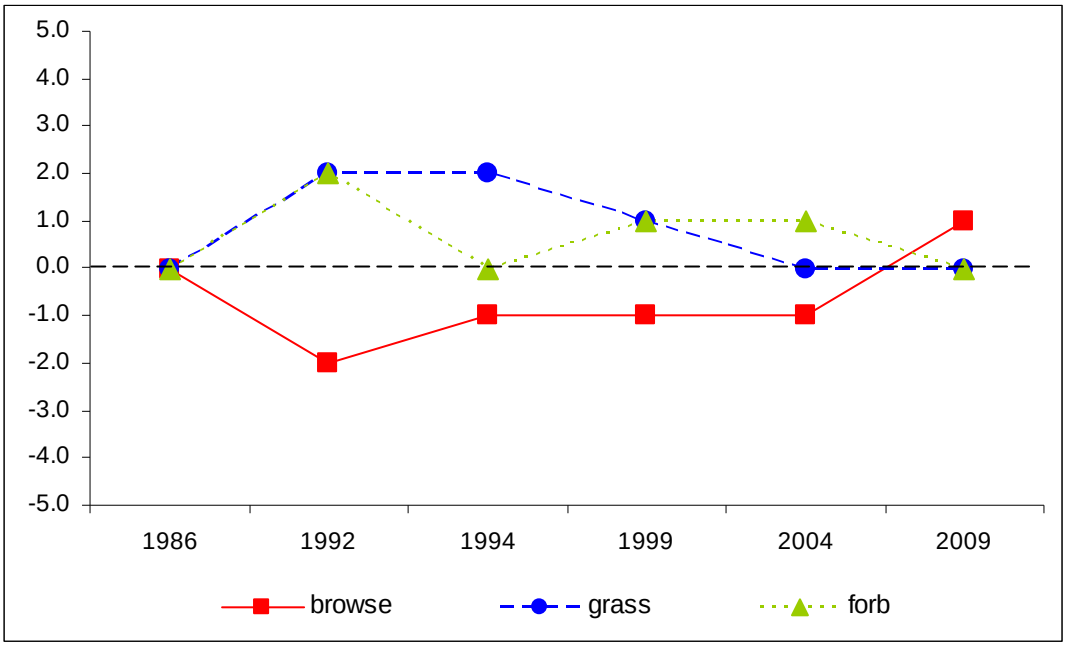
- **1986 to 1992 - up (+2):** There was a substantial increase in the sum of nested frequency of perennial forbs with a significant increase in many important forage species.
- **1992 to 1994 - down (-2):** The sum of nested frequency of perennial forbs decreased by 71% and cover decreased from 26% to 2%. Many of the perennial forb species that were abundant in 1992 were not sampled or were rare in 1994.
- **1994 to 1999 - slightly up (+1):** The sum of nested frequency of perennial forbs increased by 22% and cover increased to 6%.
- **1999 to 2004 - stable (0):** There was little change in the sum of nested frequency of perennial forbs, though cover decreased slightly to 3%.
- **2004 to 2009 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 23% and cover decreased to 2%.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --
Management unit 14, study no: 14

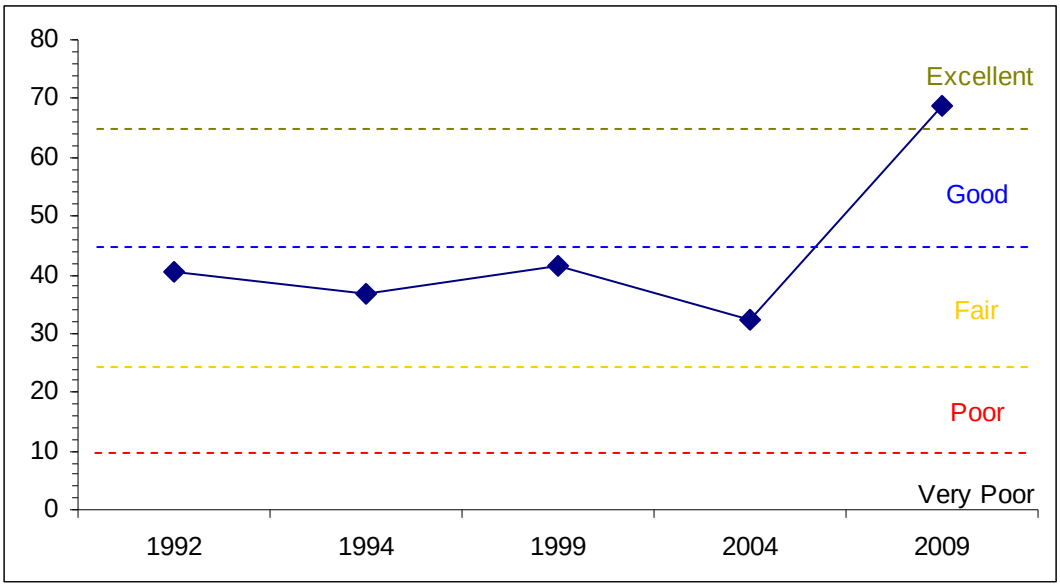
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	**Total Score**	Ranking
92	0.5	0.0	0.0	30.0	0.0	10.0	0.0	**40.5**	Fair
94	3.0	0.0	0.0	30.0	0.0	3.7	0.0	**36.6**	Fair
99	1.4	0.0	0.0	30.0	0.0	10.0	0.0	**41.4**	Fair
04	1.2	0.0	0.0	25.0	0.0	6.0	0.0	**32.3**	Fair
09	7.6	14.3	11.9	30.0	0.0	4.9	0.0	**68.7**	Excellent

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14, Study no: 14



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
Management unit 14, Study no: 14



HERBACEOUS TRENDS--
Management unit 14, Study no: 14

Type	Species	Nested Frequency						Average Cover %				
		'86	'92	'94	'99	'04	'09	'92	'94	'99	'04	'09
G	Agropyron cristatum	$_{ab}$252	$_{a}$235	$_{bc}$280	$_{c}$306	$_{a}$206	$_{bc}$278	15.33	17.76	15.43	9.51	16.07
G	Bromus tectorum (a)	-	-	-	2	-	-	-	-	.00	-	-
G	Sporobolus cryptandrus	$_{a}$30	$_{d}$241	$_{d}$206	$_{bc}$124	$_{c}$142	$_{b}$101	17.44	4.88	1.80	2.91	1.97
G	Stipa comata	$_{b}$29	$_{a}$2	$_{a}$4	$_{ab}$11	$_{a}$11	$_{a}$-	.03	.06	.08	.09	-
G	Vulpia octoflora (a)	-	-	4	3	-	13	-	.01	.00	-	.02
Total for Annual Grasses		0	0	4	5	0	13	0	0.00	0.00	0	0.02
Total for Perennial Grasses		311	478	490	441	359	379	32.81	22.71	17.31	12.52	18.05
Total for Grasses		311	478	494	446	359	392	32.81	22.72	17.32	12.52	18.07
F	Artemisia dracunculus	-	-	-	6	3	-	-	-	.30	.15	-
F	Astragalus convallarius	$_{ab}$9	$_{b}$20	$_{ab}$14	$_{b}$31	$_{a}$2	$_{a}$5	.46	.07	.83	.00	.03
F	Astragalus sp.	$_{b}$13	$_{a}$-	$_{a}$-	$_{ab}$6	$_{b}$14	$_{a}$-	-	-	.06	.11	-
F	Calochortus nuttallii	-	1	-	-	-	-	.00	-	-	-	-
F	Castilleja sp.	$_{a}$-	$_{a}$-	$_{b}$24	$_{a}$-	$_{a}$-	$_{a}$-	-	.06	-	-	-
F	Chenopodium sp. (a)	-	$_{b}$17	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$28	.65	-	-	-	.07
F	Comandra pallida	-	-	-	-	2	-	-	-	-	.01	-
F	Conyza canadensis (a)	-	10	-	-	-	-	.02	-	-	-	-
F	Cordylanthus wrightii (a)	-	$_{a}$10	$_{a}$-	$_{a}$-	$_{b}$25	$_{a}$-	.52	-	-	.20	-
F	Descurainia pinnata (a)	-	-	-	4	3	-	-	-	.01	.00	-
F	Epilobium sp.	$_{a}$-	$_{b}$13	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	.15	-	-	-	-
F	Erigeron pumilus	$_{ab}$18	$_{ab}$25	$_{b}$27	$_{a}$3	$_{a}$4	$_{b}$37	1.72	.52	.01	.03	.83
F	Eriogonum cernuum (a)	-	3	-	-	-	5	.03	-	-	-	.06
F	Euphorbia glyptosperma (a)	-	$_{b}$19	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	.04	-	-	-	-
F	Gayophytum ramosissimum(a)	-	-	3	-	-	-	-	.03	-	-	-
F	Gilia sp. (a)	-	-	-	-	7	-	-	-	-	.01	-

Type	Species	Nested Frequency						Average Cover %				
		'86	'92	'94	'99	'04	'09	'92	'94	'99	'04	'09
F	Lactuca serriola	$_{a}$-	$_{b}$164	$_{a}$8	$_{a}$3	$_{a}$1	$_{a}$-	5.43	.02	.00	.00	-
F	Lappula occidentalis (a)	-	-	-	3	7	-	-	-	.00	.16	-
F	Lathyrus lanszwertii	$_{a}$2	$_{bc}$38	$_{bc}$45	$_{c}$70	$_{ab}$26	$_{a}$15	1.43	.77	1.85	.12	.11
F	Leucelene ericoides	$_{a}$-	$_{a}$2	$_{a}$-	$_{ab}$20	$_{b}$30	$_{a}$2	.00	-	1.35	.47	.00
F	Machaeranthera canescens	$_{a}$-	$_{b}$262	$_{a}$-	$_{a}$3	$_{a}$15	$_{a}$2	15.27	-	.01	.19	.01
F	Oenothera sp.	-	-	-	-	1	-	-	-	-	.00	-
F	Penstemon comarrhenus	5	12	8	6	8	-	.12	.03	.07	.04	.03
F	Phlox longifolia	6	4	4	4	5	-	.01	.01	.15	.01	-
F	Plantago patagonica (a)	-	$_{b}$92	$_{b}$112	$_{c}$209	$_{b}$88	$_{a}$11	2.24	.64	6.81	.31	.05
F	Polygonum douglasii (a)	-	$_{b}$19	$_{a}$-	$_{a}$-	$_{a}$1	$_{a}$2	.69	-	-	.00	.00
F	Portulaca oleracea (a)	-	$_{b}$99	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	1.46	-	-	-	-
F	Salsola pestifer (a)	-	$_{b}$45	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	.87	-	-	-	-
F	Senecio multilobatus	1	-	-	-	-	-	-	-	-	-	-
F	Sphaeralcea coccinea	$_{ab}$55	$_{a}$40	$_{a}$38	$_{ab}$54	$_{bc}$88	$_{c}$91	1.36	.27	.88	1.83	1.39
F	Streptanthus cordatus	-	-	1	-	-	-	-	.03	-	-	-
F	Tragopogon dubius	$_{a}$-	$_{b}$17	$_{b}$6	$_{ab}$4	$_{a}$-	$_{a}$-	.25	.02	.01	-	-
F	Unknown forb-annual (a)	-	8	-	-	-	-	.18	-	-	-	-
F	Zigadenus paniculatus	-	-	-	3	3	3	-	-	.00	.00	.03
Total for Annual Forbs		0	322	115	216	131	46	6.71	0.66	6.82	0.70	0.19
Total for Perennial Forbs		109	598	175	213	202	155	26.25	1.83	5.55	3.01	2.44
Total for Forbs		109	920	290	429	333	201	32.97	2.50	12.38	3.72	2.64

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

BROWSE TRENDS--
Management unit 14, Study no: 14

Type	Species	Strip Frequency					Average Cover %				
		'92	'94	'99	'04	'09	'92	'94	'99	'04	'09
B	Amelanchier utahensis	0	0	1	0	0	-	-	.53	-	1.70
B	Artemisia tridentata tridentata	7	15	17	18	38	.22	2.38	.48	.90	3.29
B	Chrysothamnus nauseosus albicaulis	0	0	0	5	11	-	.00	-	.00	.69
B	Chrysothamnus viscidiflorus stenophyllus	6	0	6	4	1	.15	-	.38	.78	.00
B	Eriogonum microthecum	6	0	5	7	6	.18	-	.03	.06	.06
B	Gutierrezia sarothrae	51	43	28	34	44	2.94	1.25	.46	.98	1.09
B	Juniperus osteosperma	1	0	1	1	0	2.83	-	2.20	1.70	.63
B	Opuntia fragilis	8	9	25	19	27	.42	.05	.46	.33	1.23
B	Sclerocactus sp.	16	3	0	0	4	-	.03	-	-	-
Total for Browse		95	70	83	88	131	6.76	3.73	4.55	4.76	8.72

CANOPY COVER, LINE INTERCEPT--
Management unit 14, Study no: 14

Species	Percent Cover		
	'99	'04	'09
Amelanchier utahensis	-	2.28	2.21
Artemisia tridentata tridentata	-	2.81	5.61
Chrysothamnus nauseosus albicaulis	-	-	.38
Eriogonum microthecum	-	.05	-
Gutierrezia sarothrae	-	1.00	.76
Juniperus osteosperma	4.19	4.00	4.51
Opuntia fragilis	-	.16	1.04

KEY BROWSE ANNUAL LEADER GROWTH--
Management unit 14, Study no: 14

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata tridentata	2.6	1.0

POINT-QUARTER TREE DATA--
Management unit 14, Study no: 14

Species	Trees per Acre		
	'99	'04	'09
Juniperus osteosperma	10	<18	26
Pinus edulis	9	<18	23

Average diameter (in)		
'99	'04	'09
10.0	-	9.4
4.8	-	6.4

BASIC COVER--
Management unit 14, Study no: 14

Cover Type	Average Cover %					
	'86	'92	'94	'99	'04	'09
Vegetation	1.25	52.89	33.92	37.51	23.71	27.60
Rock	0	0	.03	0	0	0
Pavement	0	0	.39	0	.03	.00
Litter	58.75	29.62	51.50	44.35	32.81	42.24
Cryptogams	0	1.19	.12	.68	.19	.38
Bare Ground	40.00	29.62	22.07	24.50	52.61	43.07

SOIL ANALYSIS DATA --
Management unit 14, Study no: 14, Study Name: Texas Flat

Effective rooting depth (in)	pH	sandy loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
7.9	6.9	76.9	8.6	14.6	1.6	12.7	89.6	0.4

PELLET GROUP DATA--
Management unit 14, Study no: 14

Type	Quadrat Frequency				
	'92	'94	'99	'04	'09
Rabbit	11	34	48	40	59
Elk	-	-	-	3	3
Deer	7	14	8	33	15
Cattle	6	1	19	18	9

Days use per acre (ha)		
'99	'04	'09
-	-	-
-	2 (5)	7 (17)
19 (47)	17 (41)	9 (22)
46 (114)	30 (73)	12 (29)

BROWSE CHARACTERISTICS--
Management unit 14, Study no: 14

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Amelanchier utahensis									
86	**0**	0	0	-	-	0	0	0	-/-
92	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	123/102
99	**20**	0	100	-	-	0	0	0	129/150
04	**0**	0	0	-	-	0	0	0	119/157
09	**0**	0	0	-	-	0	0	0	106/111
Artemisia tridentata tridentata									
86	**5465**	83	13	4	3133	2	0	0	25/24
92	**180**	22	78	0	380	22	0	0	-/-
94	**500**	4	88	8	20	0	0	16	24/23
99	**500**	4	84	12	80	8	0	4	30/31
04	**540**	7	63	30	22400	44	26	11	28/38
09	**1700**	40	56	4	240	6	0	1	28/46
Chrysothamnus nauseosus albicaulis									
86	**0**	0	0	0	-	0	0	0	-/-
92	**0**	0	0	0	-	0	0	0	-/-
94	**0**	0	0	0	-	0	0	0	18/21
99	**0**	0	0	0	-	0	0	0	44/32
04	**120**	0	67	33	-	0	33	0	21/28
09	**300**	7	93	0	-	7	0	0	18/23
Chrysothamnus viscidiflorus stenophyllus									
86	**199**	100	0	0	-	0	0	0	-/-
92	**160**	25	75	0	-	50	13	0	-/-
94	**0**	0	0	0	-	0	0	0	-/-
99	**140**	14	86	0	-	0	0	0	19/27
04	**100**	0	80	20	-	20	0	20	12/17
09	**20**	100	0	0	-	0	0	0	13/19

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Eriogonum microthecum									
86	**799**	100	0	0	66	0	0	0	-/-
92	**480**	0	96	4	-	8	0	0	-/-
94	**0**	0	0	0	-	0	0	0	-/-
99	**160**	13	88	0	-	75	13	0	12/13
04	**440**	0	91	9	-	9	91	0	7/8
09	**180**	11	89	0	-	0	0	0	10/9
Gutierrezia sarothrae									
86	**2465**	19	68	14	66	0	0	0	9/7
92	**3080**	11	89	0	20	0	0	0	-/-
94	**2340**	7	79	14	20	0	0	3	10/12
99	**2020**	36	64	0	80	0	0	0	8/7
04	**2160**	2	95	3	20	17	.92	0	6/7
09	**2620**	15	84	1	-	0	0	0	8/8
Juniperus osteosperma									
86	**0**	0	0	-	-	0	0	0	-/-
92	**20**	0	100	-	20	0	100	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**20**	0	100	-	-	0	0	0	-/-
04	**20**	0	100	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-
Mahonia repens									
86	**0**	0	0	-	-	0	0	0	-/-
92	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	6/24
09	**0**	0	0	-	-	0	0	0	-/-
Opuntia fragilis									
86	**1799**	85	15	0	-	0	0	0	4/8
92	**220**	45	45	9	-	9	0	9	-/-
94	**340**	24	71	6	-	0	0	12	6/13
99	**680**	38	47	15	60	0	0	26	5/18
04	**540**	11	78	11	20	0	0	11	5/17
09	**720**	17	83	0	-	0	0	0	6/19
Sclerocactus sp.									
86	**0**	0	0	-	-	0	0	0	-/-
92	**720**	64	36	-	-	3	0	0	-/-
94	**60**	67	33	-	-	0	0	0	-/-
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**80**	75	25	-	-	0	0	0	3/8

		Age class distribution				Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Yucca sp.									
86	**0**	0	0	-	-	0	0	0	-/-
92	**0**	0	0	-	-	0	0	0	-/-
94	**0**	0	0	-	-	0	0	0	16/39
99	**0**	0	0	-	-	0	0	0	-/-
04	**0**	0	0	-	-	0	0	0	-/-
09	**0**	0	0	-	-	0	0	0	-/-