

Trend Study 16A-16-07

Study site name: Levan Farm Chaining .

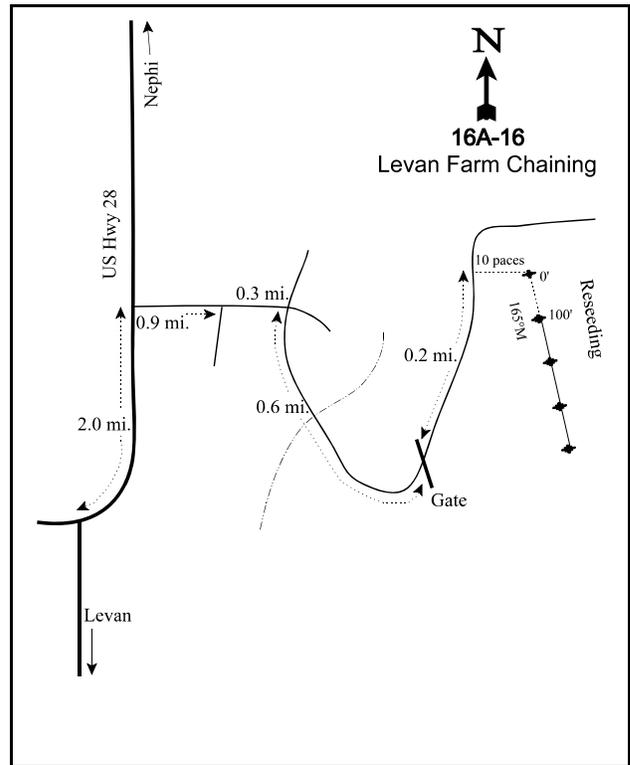
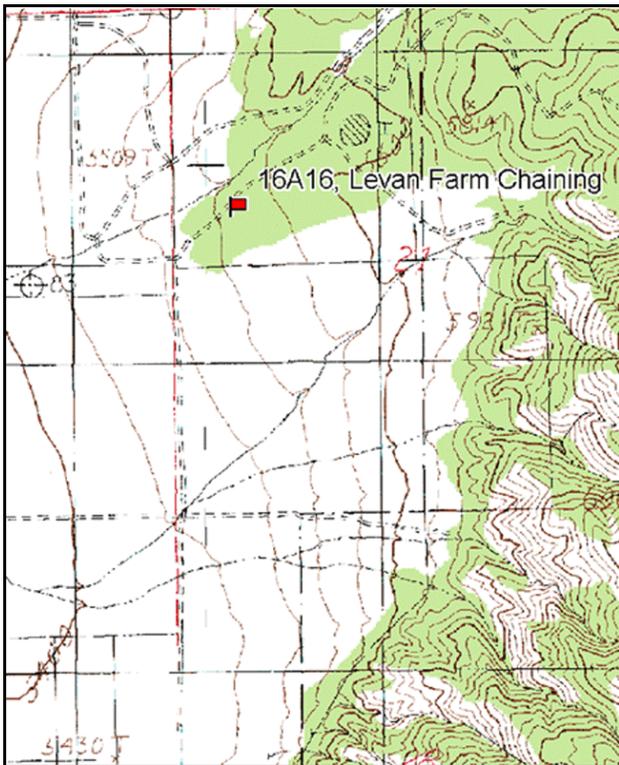
Vegetation type: Chained, Seeded P-J .

Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From the junction of Highway U.S. 78 and Highway 28 in Levan, proceed north towards Nephi for 2.0 miles to a dirt road to the east. Turn right and proceed east for 0.90 miles to a fork. Continue straight ahead for 0.30 miles to a 3-way fork. Take the right (southernmost) fork for 0.60 miles through a gate to another fork. Take the left fork for 0.20 miles to a chained-reseeded area, and stop. The baseline is located 10 paces to the east between two windrows of slash. The study is marked by green steel "T" fenceposts approximately 12 to 18 inches in height. A red browse tag, number 3965, is attached to the 0-foot stake of the baseline.



Map Name: Levan

Diagrammatic Sketch

Township 14S, Range 1E, Section 21

GPS: NAD 83, UTM 12S 428453 E 4381673 N

## DISCUSSION

### Levan Farm Chaining - Trend Study No. 16A-16

#### Study Information

This study is located on a chained pinyon-juniper treatment northeast of Levan [elevation: 5,530 feet (1,686 m), slope: 1%, aspect: west]. Since it is used by deer and elk during severe winters, the land was purchased by the UDWR shortly after the chaining was completed. The area was not seeded, and therefore has little perennial ground cover. This study is similar to the Old Pinery study (16A-15), except the juniper slash was windrowed. Wildlife use has been relatively light since 1983 due to the lack of forage. Deer pellet quadrat frequency was 16% in 1997, and use was estimated at 50 deer days use/acre (122 ddu/ha) in 2002 and 17 days use/acre (41 ddu/ha) in 2007. Cow pat frequency was 4% in 1997, and use was estimated at 2 days use/acre (4 cdu/ha) in 2007. Cattle were present during the 2007 reading. Rabbit use has steadily increased from a pellet quadrat frequency of 7% in 1997 to 65% in 2007.

#### Soil

The soil is classified within the Borvant series (USDA-NRCS 2007). The soils in this series are shallow and well-drained, with possible petrocalcic horizons. They formed in alluvium or colluvium derived from limestone and sandstone. The soil texture is a clay loam, and the pH is neutral (7.1). Soil phosphorus is relatively low at 7.7 ppm. When the study was established in 1983, bare ground cover was high at 35%, and erosion was reported to be occurring. Relative bare ground cover steadily decreased from 19% in 2002 to 12% in 2007, while relative vegetative cover increased from 24% in 2002 to 44% in 2007. The erosion condition was classified as stable in 2002 and 2007.

#### Browse

Valuable browse forage is limited and consists entirely of basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*). Some sagebrush plants were apparently transplanted after the chaining, and the initial reading estimated density at 100 plants/acre (247 plants/ha), but no plants were sampled in 1989. Sagebrush density increased from 660 plants/acre (1,631 plants/ha) in 1997 to 1,540 plants/acre (3,805 plants/ha) in 2002, then slightly decreased to 1,320 plants/acre (3,262 plants/ha) in 2007. Sagebrush has increased from 3% to 7% cover from 1997 to 2007. The population was made up entirely of young and mature plants in 1997, and the age structure shifted to mostly mature in 2002 and 2007. Decadence increased from 0% of the population in 1997 to 10% in 2002 and 21% in 2007. All of the sampled plants were vigorous until 2002 and 2007, when 3% and 9% of the population, respectively, displayed poor vigor. Use was mostly light from 1983 to 2002 and moderate-heavy in 2007. Insect galls were found on some of the plants in 2007. Annual leader growth averaged 2.2 inches (5.6 cm) in 2002 and 2.3 inches (5.8 cm) in 2007.

The only other common browse species is broom snakeweed (*Gutierrezia sarothrae*), which increased in density from 3,066 plants/acre (7,576 plants/ha) in 1983 to 23,060 plants/acre (56,980 plants/ha) in 1997 when the baseline was lengthened. Density decreased to 3,780 plants/acre (9,340 plants/ha) in 2002 and 2,980 plants/acre (7,363 plants/ha). The majority of the sampled plants in 2002 were decadent and displayed poor vigor, but vigor improved greatly by 2007, and most plants were mature.

Utah juniper (*Juniperus osteosperma*) trees are also present. Point-centered quarter data estimated 18 trees/acre (44 trees/ha) in 2002 and 34 trees/acre (84 trees/ha) in 2007. Average trunk diameter was 5.4 inches (13.7 cm) in 2002 and 9.8 inches (24.2 plants/ha) in 2007. The majority of the sampled trees were 8 to 12 feet (2.4 to 3.7 m) tall in 2007.

#### Herbaceous Understory

The herbaceous understory is very poor and dominated by annuals and biennial weeds. Total grass cover was 5% in 1997, 16% in 2002, and 27% in 2007. Cheatgrass (*Bromus tectorum*) has provided 80%-93% of the total

grass cover since 1997. Japanese brome (*Bromus japonicus*), squirreltail (*Sitanion hystrix*), and Indian ricegrass (*Oryzopsis hymenoides*) are also relatively abundant.

Perennial forbs are rare. Bur buttercup (*Ranunculus testiculatus*), pale alyssum (*Alyssum alyssoides*), and storksbill (*Erodium cicutarium*) have accounted for the majority of the forb cover since 1997. Bur buttercup and storksbill have both been shown to prevent the establishment of other species (Buchanan et al. 1978, Kimball and Schiffman 2003). Bindweed (*Convolvulus arvensis*) and blue lettuce (*Lactuca pulchella*), both noxious weeds, have also been sampled.

#### 1989 TREND ASSESSMENT

The trend for browse is slightly down. No sagebrush plants were sampled within the density plots, however, some of the transplanted sagebrush survived and were approximately 5 feet (1.5 m) tall. The plants were vigorous with high seed production, and were surrounded by seedlings. The trend for grass is slightly up. The sum of nested frequency for perennial grasses increased, and the number of grass species sampled increased from one to three. However, the total quadrat frequency for perennial grasses was only 8%. The trend for forbs is up. The sum of nested frequency for perennial forbs, with the exception of blue lettuce, increased substantially. Blue lettuce decreased significantly in nested frequency. The number of sampled forb species doubled from four to eight, and common sunflower (*Helianthus annuus*) increased significantly in nested frequency.

browse - slightly down (-1)      grass - slightly up (+1)      forb - up (+2)

#### 1997 TREND ASSESSMENT

The trend for browse is slightly up. Sagebrush density increased from 0 plants/acre to 660 plants/acre (1,631 plants/ha), although this increase was partly attributed to the larger sampling area. Young recruitment was high at 52% of the population, and no decadent plants were sampled. All of the plants were vigorous, and use was light. The trend for grass is up. The sum of nested frequency for perennial grasses increased substantially, and bluebunch wheatgrass (*Agropyron spicatum*) was sampled for the first time. The trend for forbs is slightly up. Although the sum of nested frequency for perennial forbs increased 23%, two noxious weeds, blue lettuce and field bindweed, were sampled. Sunflower decreased significantly in nested frequency. The Desirable Components Index (DCI) was rated as very poor due to low browse and perennial herbaceous cover and the presence of two noxious weeds.

winter range condition (DCI) - very poor (0) Mid-level potential scale  
browse - slightly up (+1)      grass - up (+2)      forb - slightly up (+1)

#### 2002 TREND ASSESSMENT

The trend for browse is up. Sagebrush density increased from 660 plants/acre (1,631 plants/ha) to 1,540 plants/acre (3,805 plants/ha), and average cover increased from 3% to 6%. Vigor remained good on most plants, and use increased, with 23% of the population showing moderate-heavy use. Young recruitment decreased from 52% of the population to 3%, while decadence increased from 0% to 10% of the population. The trend for grass is stable. The sum of nested frequency for perennial grasses increased 43%, and squirreltail increased significantly in nested frequency. However, cheatgrass also increased significantly in nested frequency, and its average cover increased from 4% to 15%. The trend for forbs is down. The sum of nested frequency for perennial forbs decreased 60%. Bur buttercup and sunflower also decreased significantly in nested frequency. Blue lettuce and field bindweed were not sampled. The DCI rating remained very poor.

winter range condition (DCI) - very poor (12) Mid-level potential scale  
browse - up (+2)      grass - stable (0)      forb - down (-2)

## 2007 TREND ASSESSMENT

The trend for browse is slightly down. Sagebrush density decreased 14%, from 1,540 plants/acre (3,805 plants/ha) to 1,320 plants/acre (3,262 plants/ha). Plants displaying poor vigor increased from 3% of the population to 9%, and use increased to mostly moderate-heavy. Young recruitment remained stable at 3% of the population, while decadence increased from 10% of the population to 21%. The trend for grass is stable. The sum of nested frequency for perennial grasses increased 40%, however, Japanese brome increased significantly in nested frequency. Quadrat frequency for Japanese brome increased from 8% to 80%, and its cover increased from nearly 0% to 2%. Cheatgrass nested frequency remained stable, although its average cover increased from 15% to 22%. The trend for forbs is slightly up. The sum of nested frequency for perennial forbs increased 60%. However, field bindweed and blue lettuce both re-emerged. Storksbill and pale alyssum increased significantly in nested frequency, while bur buttercup decreased significantly in nested frequency. The DCI rating remained very poor.

winter range condition (DCI) - very poor (3) Mid-level potential scale

browse - slightly down (-1)

grass - stable (0)

forb - slightly up (+1)

## HERBACEOUS TRENDS --

Management unit 16A, Study no: 16

Type	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
G	Agropyron intermedium	-	a4	a2	a4	-	.00	.00	-
G	Agropyron spicatum	-	-	a10	a4	a6	.22	.19	.21
G	Bromus japonicus (a)	-	-	-	a18	b219	-	.06	2.26
G	Bromus tectorum (a)	-	-	a269	b346	b353	4.20	14.61	22.20
G	Oryzopsis hymenoides	-	-	a8	a8	a23	.36	.25	.85
G	Poa secunda	a6	a9	a17	a8	a17	.38	.09	.41
G	Sitanion hystrix	-	a3	a7	b39	b41	.06	.55	1.25
G	Stipa thurberiana	-	-	-	-	1	-	-	.15
Total for Annual Grasses		0	0	269	364	572	4.20	14.67	24.47
Total for Perennial Grasses		6	16	44	63	88	1.04	1.10	2.88
Total for Grasses		6	16	313	427	660	5.24	15.77	27.35
F	Agoseris glauca	-	-	6	-	-	.03	-	-
F	Alyssum alyssoides (a)	-	-	ab281	a266	b313	3.72	.94	6.13
F	Astragalus eurekensis	-	3	-	-	-	-	-	-
F	Asclepias speciosa	-	1	-	-	-	-	-	-
F	Astragalus sp.	-	-	-	2	-	-	.03	-
F	Camelina microcarpa (a)	-	-	9	-	-	.07	-	-
F	Calochortus nuttallii	a3	-	a4	-	-	.03	-	-
F	Chorispora tenella (a)	-	-	a5	a1	a1	.03	.00	.00
F	Cirsium sp.	-	a14	a1	a7	a10	.03	.06	.01
F	Convolvulus arvensis	-	-	a10	-	a18	.39	-	.40
F	Comandra pallida	-	-	-	2	-	-	.00	-

T y p e	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
F	<i>Collinsia parviflora</i> (a)	-	-	-	<sub>a</sub> 7	<sub>a</sub> 3	-	.04	.00
F	<i>Crepis acuminata</i>	-	-	3	-	-	.00	-	-
F	<i>Draba</i> sp. (a)	-	-	-	-	1	-	-	.00
F	<i>Epilobium brachycarpum</i> (a)	-	-	13	-	-	.07	-	-
F	<i>Erodium cicutarium</i> (a)	-	-	<sub>a</sub> 54	<sub>a</sub> 52	<sub>b</sub> 178	.41	.87	10.10
F	<i>Gilia</i> sp. (a)	-	-	<sub>a</sub> 1	<sub>a</sub> 3	-	.00	.00	-
F	<i>Helianthus annuus</i> (a)	<sub>a</sub> 3	<sub>d</sub> 240	<sub>c</sub> 166	<sub>b</sub> 56	<sub>a</sub> -	.41	.13	.00
F	<i>Holosteum umbellatum</i> (a)	-	-	-	-	4	-	-	.01
F	<i>Lactuca pulchella</i>	<sub>b</sub> 226	<sub>a</sub> 13	<sub>a</sub> 12	-	<sub>a</sub> 10	.03	-	.05
F	<i>Leucelene ericoides</i>	-	-	-	<sub>a</sub> 3	<sub>a</sub> 3	-	.00	.15
F	<i>Marrubium vulgare</i>	1	-	-	-	-	-	-	-
F	<i>Microsteris gracilis</i> (a)	-	-	-	9	1	-	.01	.00
F	<i>Ranunculus testiculatus</i> (a)	-	-	<sub>c</sub> 264	<sub>b</sub> 202	<sub>a</sub> 166	4.43	.95	.84
F	<i>Sisymbrium altissimum</i> (a)	-	-	<sub>a</sub> 7	<sub>a</sub> -	<sub>a</sub> 13	.04	.00	.05
F	<i>Sphaeralcea coccinea</i>	-	<sub>a</sub> 3	<sub>a</sub> 2	-	-	.15	-	-
F	<i>Streptanthus cordatus</i>	-	<sub>a</sub> 4	<sub>a</sub> 3	<sub>a</sub> 1	-	.01	.03	-
F	<i>Taraxacum officinale</i>	-	-	4	-	-	.15	-	-
F	<i>Tragopogon dubius</i>	-	<sub>a</sub> 5	<sub>a</sub> 14	<sub>a</sub> -	<sub>a</sub> 11	.03	.00	.05
Total for Annual Forbs		3	240	800	596	680	9.20	2.97	17.15
Total for Perennial Forbs		230	43	59	15	52	0.87	0.14	0.66
Total for Forbs		233	283	859	611	732	10.07	3.11	17.81

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

#### BROWSE TRENDS --

Management unit 16A, Study no: 16

T y p e	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	<i>Artemisia tridentata</i> tridentata	24	31	33	2.83	5.95	6.90
B	<i>Chrysothamnus nauseosus</i> albicaulis	0	1	0	.85	.00	-
B	<i>Chrysothamnus viscidiflorus</i> stenophyllus	0	1	0	-	.03	-
B	<i>Gutierrezia sarothrae</i>	93	62	63	9.29	2.20	1.16
B	<i>Juniperus osteosperma</i>	1	0	0	.38	-	1.00
Total for Browse		118	95	96	13.35	8.19	9.07

CANOPY COVER, LINE INTERCEPT --

Management unit 16A, Study no: 16

Species	Percent Cover	
	'02	'07
Artemisia tridentata tridentata	-	9.03
Gutierrezia sarothrae	-	.88
Juniperus osteosperma	.06	1.20

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 16A, Study no: 16

Species	Average leader growth (in)	
	'02	'07
Artemisia tridentata tridentata	2.2	2.3

POINT-QUARTER TREE DATA --

Management unit 16A, Study no: 16

Species	Trees per Acre		
	'97	'02	'07
Juniperus osteosperma	-	.80	34

Average diameter (in)		
'97	'02	'07
3.4	5.4	9.8

BASIC COVER --

Management unit 16A, Study no: 16

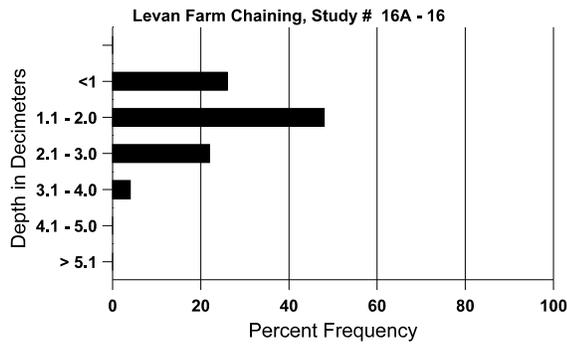
Cover Type	Average Cover %				
	'83	'89	'97	'02	'07
Vegetation	0	1.75	31.58	28.32	48.98
Rock	3.00	3.00	2.70	2.68	2.40
Pavement	3.75	18.00	13.90	3.82	4.27
Litter	58.25	47.50	29.85	52.71	36.84
Cryptogams	0	0	2.36	6.25	6.46
Bare Ground	35.00	29.75	23.82	21.95	12.87

SOIL ANALYSIS DATA --

Herd Unit 16A, Study no: 16, Levan Farm Chaining

Effective rooting depth (in)	Temp °F (depth)	pH	Clay loam			%OM	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
13.9	50.6 (16.9)	7.1	41.1	29.1	29.8	2.6	7.7	92.8	.5

## Stoniness Index



### PELLET GROUP DATA --

Management unit 16A, Study no: 16

Type	Quadrat Frequency				
	'83	'89	'97	'02	'07
Rabbit	-	-	7	22	65
Elk	-	-	-	-	1
Deer	-	-	16	25	19
Cattle	-	-	4	-	1

Days use per acre (ha)	
'02	'07
-	-
-	-
50 (122)	17 (41)
-	2 (4)

### BROWSE CHARACTERISTICS --

Management unit 16A, Study no: 16

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	Utilization		% decadent	% dying	% poor vigor	Average Height Crown (in)
							% moderate	% heavy				
<b>Artemisia tridentata tridentata</b>												
83	100	-	-	100	-	-	0	0	0	-	0	16/24
89	0	-	-	-	-	-	0	0	0	-	0	-/-
97	660	60	340	320	-	-	0	0	0	-	0	32/41
02	1540	-	40	1340	160	80	22	1	10	1	3	30/32
07	1320	-	40	1000	280	100	8	50	21	5	9	42/44
<b>Chrysothamnus nauseosus albicaulis</b>												
83	0	-	-	-	-	-	0	0	0	-	0	-/-
89	66	-	66	-	-	-	0	0	0	-	0	-/-
97	0	-	-	-	-	-	0	0	0	-	0	-/-
02	20	-	-	-	20	-	0	0	100	100	100	24/34
07	0	-	-	-	-	-	0	0	0	-	0	24/29

		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 viscidiflorus stenophyllus</i>												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
02	40	-	-	40	-	-	100	0	-	-	0	3/7
07	0	-	-	-	-	-	0	0	-	-	0	9/22
<i>Gutierrezia sarothrae</i>												
83	3066	-	100	2900	66	-	0	0	2	-	0	9/9
89	3765	10066	366	2866	533	-	0	0	14	1	2	9/10
97	23060	3900	5300	17540	220	500	0	0	1	.43	.43	7/9
02	3780	-	-	1460	2320	7880	.52	0	61	32	59	6/8
07	2980	300	360	2380	240	80	3	1	8	3	4	8/9
<i>Juniperus osteosperma</i>												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	20	-	20	-	-	40	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Quercus gambelii</i>												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	20	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Rhus trilobata</i>												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	71/148
07	0	-	-	-	-	-	0	0	-	-	0	87/162
<i>Ribes sp.</i>												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	4/12
07	0	-	-	-	-	-	0	0	-	-	0	-/-