

Trend Study 21A-16-07

Study site name: Nephi Dump.

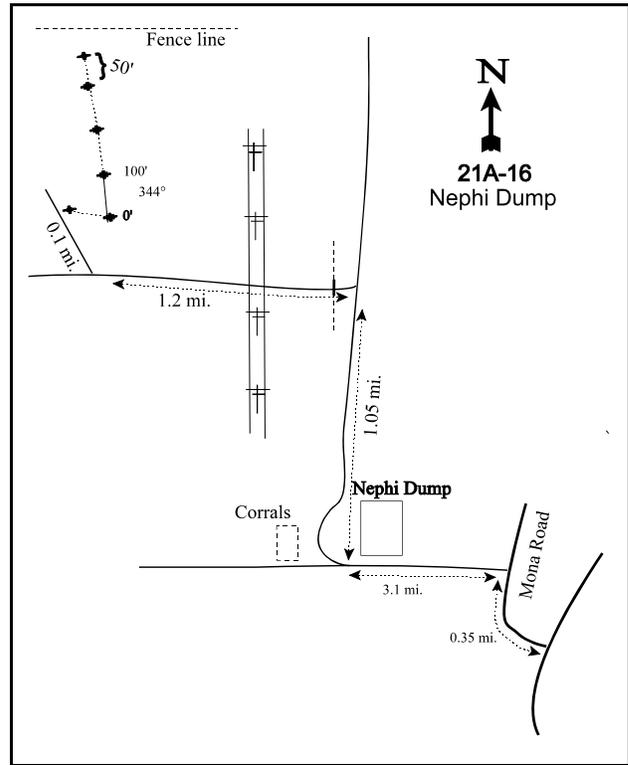
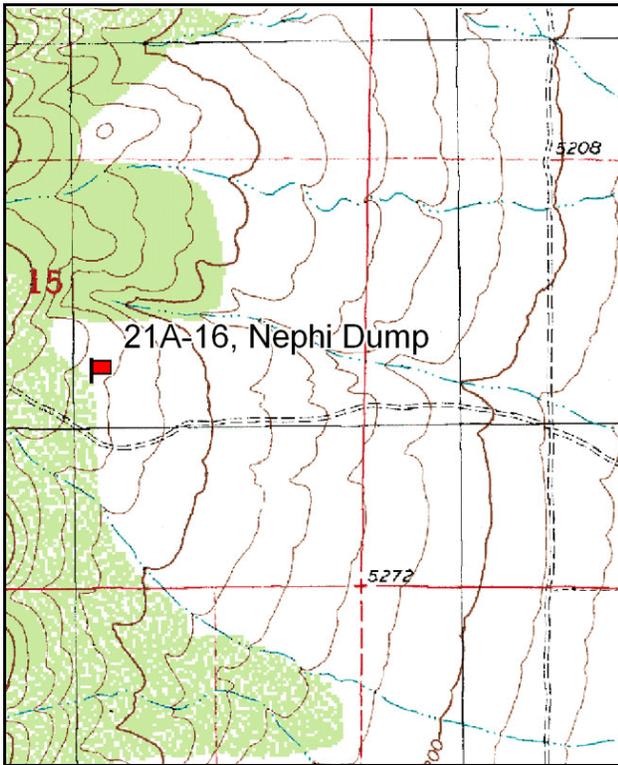
Vegetation type: Stansbury Cliffrose.

Compass bearing: frequency baseline 344 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (29ft).

LOCATION DESCRIPTION

From the Nephi City Dump, travel north on a gravel road for 1.05 miles and then turn left (west) just after passing through a cattle guard. Travel west for 1.25 miles and turn right (north) onto a faint road and go 0.1 mile. At this point, there is a small stockpile and a short red steel stake. From here, walk east a short distance to the 0-foot mark of the frequency baseline, marked by a steel fencepost with a red browse tag, number 3942, attached.



Map Name: Slate Jack Canyon

Diagrammatic Sketch

Township 12S, Range 1W, Section 15

GPS: NAD 83, UTM 12S 420980 E 4402330 N

DISCUSSION

Nephi Dump - Trend Study No. 21A-16

Study Information

This study samples deer winter range located northwest of Nephi on the east side of Long Ridge [elevation: 5,500 feet (1,676 m), slope: 5%-10%, aspect: east]. It supports a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) community interspersed with Utah juniper (*Juniperus osteosperma*) and Stansbury cliffrose (*Cowania mexicana* ssp. *stansburiana*). The study is located within an area of approximately 40 acres (16 ha) that was not burned by the extensive fires of 1996, however, much of the surrounding vegetation was burned in 1986 and 1996. Deer use was estimated at 31 days use/acre (76 ddu/ha) in 2002 and 18 days use/acre (45 ddu/ha) in 2007. Cattle also graze the area, and use was estimated at 7 days use/acre (16 cdu/ha) in 2002 and 24 days use/acre (59 cdu/ha) in 2007.

Soil

The soil is classified within the Pibler series (USDA-NRCS 2007). The soils in this series are shallow over petrocalcic, well-drained soils that formed in alluvium mainly from sedimentary rocks. The soil texture is a clay loam with a neutral reaction (pH 6.9). Relative combined rock and pavement cover has averaged 18%-23% since 1997, and combined vegetation and litter cover has averaged 57%-69%. The soil erosion condition was classified as stable in 2002 and 2007.

Browse

The preferred browse species is mountain big sagebrush, which has provided 50%-60% of the total browse cover since 1997. Identification of this species has been problematic due to differing growth forms. It is likely that a minor component of basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) is also present. Sagebrush density steadily declined from 3,400 plants/acre (8,401 plants/ha) in 1983 to 1,920 plants/acre (4,744 plants/ha) in 1997, increased to 2,220 plants/acre (5,486 plants/ha) in 2002, then decreased to 1,740 plants/acre (4,299 plants/ha) in 2007. Average cover decreased from 11% in 1997 to 6% by 2007. Decadence has ranged from 20% to 47% of the population since 1983, while young plants have comprised less than 10% of the population. Plants displaying poor vigor have fluctuated from 8% to 28% of the population since 1983. Use has been light-moderate in all years, with some heavy use in 1989, 2002, and 2007. Annual leader growth averaged 2.2 inches (5.6 cm) in 2002 and 1.9 inches (4.9 cm) in 2007.

Stansbury cliffrose also provides some browse, but occurs infrequently. Cliffrose density decreased from 166 plants/acre (410 plants/ha) in 1983 to 40 plants/acre (99 plants/ha) in 1997, and was not sampled within the density strips in 2002 and 2007. Use was light-moderate in 1983 and heavy in all other sample years. Annual leader growth averaged 3 inches (7.6 cm) in 2007.

Point-centered quarter data estimates of juniper density were 52 trees/acre (128 trees/ha) in 2002 and 43 trees/acre (106 trees/ha) in 2007. Although juniper density estimates decreased, tree size increased. Average trunk diameter was 3.9 inches (9.9 cm) in 2002 and 7.5 inches (19 cm) in 2007. The majority of the trees sampled in 2007 were over 4 feet (1.2 m) in height.

Herbaceous Understory

Perennial herbaceous species have steadily increased in nested frequency since 1983. The dominant perennial grasses include crested wheatgrass (*Agropyron cristatum*), Sandberg bluegrass (*Poa secunda*), and bluebunch wheatgrass (*Agropyron spicatum*). Average perennial grass cover has been 15%-18% since 1997. Average cheatgrass (*Bromus tectorum*) cover increased from 3% in 2002 to 10% in 2007. This species provided 15% of the total grass cover in 2002 and 37% in 2007.

The forb component is dominated by annual species. Average forb cover has increased from 5% in 1997 and 2002 to 7% in 2007. Pale alyssum (*Alyssum alyssoides*) and bur buttercup (*Ranunculus testiculatus*) are the dominant forbs, and have provided over 60% of the total forb cover since 1997. Bur buttercup cover increased from 1% in 1997 to 3% in 2002 and 4% in 2007. Bur buttercup is an undesirable, allelopathic annual (Buchanan et al. 1978).

1989 TREND ASSESSMENT

The trend for browse is down. Sagebrush density decreased from 3,400 plants/acre (8,401 plants/ha) to 2,766 plants/acre (6,835 plants/ha). Decadence increased from 26% to 39% of the population, and young recruitment decreased from 9% to 0% of the population. Plants displaying poor vigor increased from 8% of the population to 18%. Use increased, with approximately half of the sampled plants showing moderate-heavy use. Cliffrose density also decreased from 166 plants/acre (410 plants/ha) to 133 plants/acre (329 plants/ha). Decadence increased to 25% of the population, and use also increased to heavy. The trend for grass is up. The sum of nested frequency for perennial grasses increased 57%. Sandberg bluegrass increased significantly in nested frequency. The trend for forbs is up. The sum of nested frequency for perennial forbs increased substantially, and the number of perennial species sampled increased from three to 11.

browse - down (-2)

grass - up (+2)

forb - up (+2)

1997 TREND ASSESSMENT

The trend for browse is slightly down. Sagebrush density continued to decline from 2,766 plants/acre (6,835 plants/ha) to 1,920 plants/acre (4,744 plants/ha), although some of this change can be attributed to the increase in sampling area. Young recruitment increased to 5% of the population, and seedlings were sampled for the first time at a density of 60 seedlings/acre (148 seedlings/ha). Plants displaying poor vigor continued to increase from 18% to 28% of the population. Use slightly decreased to light-moderate. Cliffrose density decreased substantially, from 133 plants/acre (329 plants/ha) to 40 plants/acre (99 plants/ha). Decadence increased from 25% to 50% of the population and use remained heavy. The trend for grass is up. The sum of nested frequency for perennial grasses increased 65%. Crested wheatgrass increased significantly in nested frequency. The trend for forbs is slightly up. The sum of nested frequency for perennial forbs doubled. Segó lily (*Calochortus nuttallii*) increased significantly in nested frequency. The Desirable Components Index (DCI) was rated as fair due to moderate browse cover with low young recruitment and low perennial forb cover, but high perennial grass cover.

winter range condition (DCI) - fair (52) Mid-level potential scale

browse - slightly down (-1)

grass - up (+2)

forb - slightly up (+1)

2002 TREND ASSESSMENT

The trend for browse is stable. Sagebrush density increased from 1,920 plants/acre (4,744 plants/ha) to 2,220 plants/acre (5,486 plants/ha) and average cover slightly decreased from 11% to 9%. Decadence increased from 20% of the population to 44%, and reproduction and recruitment declined to almost nothing. Plants classified as dying increased from 8% of the population to 14%. Vigor improved from 28% of the plants displaying poor vigor to only 15%. Use slightly increased, with 9% of the sampled plants showing heavy hedging. No cliffrose plants were sampled. The trend for grass is stable. The sum of nested frequency for perennial grasses changed little. Cheatgrass changed little in nested frequency and its average cover slightly decreased from 4% to 3%. The trend for forbs is stable. The sum of nested frequency for perennial forbs increased 17% and average cover increased from less than 1% to 2%. However, the number of perennial species sampled decreased from 11 to eight. Longleaf phlox (*Phlox longifolia*) increased significantly in nested frequency, while pale alyssum and segó lily decreased significantly in nested frequency. The DCI rating decreased to poor, mainly due to an increase in decadence and decrease in recruitment of browse.

winter range condition (DCI) - poor (45) Mid-level potential scale
browse - stable (0) grass - stable (0) forb - stable (0)

2007 TREND ASSESSMENT

The trend for browse is down. Sagebrush density declined from 2,220 plants/acre (5,486 plants/ha) to 1,740 plants/acre (4,299 plants/ha) and average cover decreased from 9% to 6%. Decadence continued to increase to 47%, and reproduction and recruitment remained very low. Almost 25% of the sampled plants were classified as dying. Plants displaying poor vigor increased from 15% of the population to 28% and use remained mostly light-moderate, with some heavy hedging. The trend for grass is stable. The sum of nested frequency for perennial forbs increased 14%, and bluebunch wheatgrass increased significantly in nested frequency. However, the nested frequency of cheatgrass almost doubled, and quadrat frequency increased from 63% to 96%. Average cheatgrass cover increased from 3% to 10%. The trend for forbs is stable. The sum of nested frequency for perennial forbs increased 16%. However, bur buttercup increased significantly in nested frequency. The DCI rating declined slightly to very poor-poor, due to decreases in browse cover and recruitment, as well as increases in browse decadence and annual grass cover.

winter range condition (DCI) - very poor-poor (34) Mid-level potential scale
browse - down (-2) grass - stable (0) forb - stable (0)

HERBACEOUS TRENDS --
Management unit 21A, Study no: 16

Type	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
G	Agropyron cristatum	a7	a17	b143	b133	b118	9.05	8.84	5.11
G	Agropyron intermedium	-	-	-	2	-	-	.03	-
G	Agropyron spicatum	a10	ab30	ab33	b38	c80	1.42	1.89	3.52
G	Bromus japonicus (a)	-	-	a22	a15	a31	.12	.05	.16
G	Bromus tectorum (a)	-	-	a183	a163	b309	4.46	2.77	10.37
G	Oryzopsis hymenoides	a1	a5	-	a4	a-	-	.03	.00
G	Poa bulbosa	-	-	-	-	5	-	-	.01
G	Poa pratensis	3	-	-	-	-	-	-	-
G	Poa secunda	a103	bc149	b161	bc182	c204	4.20	5.09	8.74
G	Sitanion hystrix	a9	a8	a8	a4	a11	.07	.21	.24
Total for Annual Grasses		0	0	205	178	340	4.58	2.83	10.53
Total for Perennial Grasses		133	209	345	363	418	14.75	16.11	17.65
Total for Grasses		133	209	550	541	758	19.34	18.94	28.18
F	Agoseris glauca	-	-	-	1	-	-	.00	-
F	Alyssum alyssoides (a)	-	-	b264	a151	b215	3.04	.37	.88
F	Astragalus calycosus	-	3	-	-	-	-	-	-
F	Astragalus cibaricus	-	-	-	-	11	-	-	.69
F	Astragalus eurekensis	-	a2	a10	b31	a7	.07	1.23	.04
F	Castilleja linariaefolia	-	a1	a1	a1	-	.01	.00	-

Type	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
F	Camelina microcarpa (a)	-	-	_a 10	-	_a 7	.02	-	.02
F	Calochortus nuttallii	_a 2	_a 6	_b 18	_a 1	_a 4	.10	.00	.02
F	Chorispura tenella (a)	-	-	_a 4	_a 6	-	.03	.30	-
F	Comandra pallida	_a 2	_a 1	-	-	-	-	-	-
F	Collinsia parviflora (a)	-	-	-	_a 6	_a 4	-	.01	.01
F	Cymopterus sp.	-	-	-	_a 6	_a 2	-	.03	.03
F	Holosteum umbellatum (a)	-	-	-	-	40	-	-	.11
F	Lactuca serriola	-	_a 2	_a 9	-	-	.02	-	-
F	Microsteris gracilis (a)	-	-	_a 3	_a 2	_a 5	.00	.01	.01
F	Phlox austromontana	-	_a 2	_a 1	_a 1	_a 2	.00	.03	.00
F	Phlox longifolia	-	_a 13	_a 17	_b 40	_b 58	.04	.27	.33
F	Ranunculus testiculatus (a)	-	-	_a 189	_a 199	_b 278	1.19	2.71	4.44
F	Senecio multilobatus	-	-	_a 5	_a 1	-	.01	.00	-
F	Sisymbrium altissimum (a)	-	-	-	_a 1	_a 2	-	.00	.03
F	Sphaeralcea coccinea	-	_a 1	_a 1	-	-	.00	-	-
F	Tragopogon dubius	-	_a 3	_a 2	-	-	.03	-	-
F	Unknown forb-annual (a)	-	-	4	-	-	.01	-	-
F	Unknown forb-perennial	2	-	-	-	-	-	-	-
F	Vicia americana	-	-	_a 2	-	_a 11	.03	-	.33
F	Zigadenus paniculatus	-	_a 1	_a 4	-	-	.01	-	-
Total for Annual Forbs		0	0	474	365	551	4.30	3.41	5.50
Total for Perennial Forbs		6	35	70	82	95	0.34	1.59	1.46
Total for Forbs		6	35	544	447	646	4.65	5.01	6.96

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

BROWSE TRENDS --

Management unit 21A, Study no: 16

Type	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	Artemisia tridentata vaseyana	65	71	64	10.92	9.01	6.35
B	Cercocarpus montanus	0	1	0	-	-	-
B	Chrysothamnus nauseosus	2	1	1	.79	.98	.63
B	Chrysothamnus viscidiflorus stenophyllus	40	46	39	5.49	4.12	3.50
B	Cowania mexicana stansburiana	2	0	0	.78	-	-
B	Gutierrezia sarothrae	34	19	7	.69	.15	.04
B	Juniperus osteosperma	1	1	1	3.40	.68	2.25
Total for Browse		144	139	112	22.08	14.94	12.78

CANOPY COVER, LINE INTERCEPT --

Management unit 21A, Study no: 16

Species	Percent Cover	
	'02	'07
Artemisia tridentata vaseyana	-	7.59
Chrysothamnus nauseosus	-	.31
Chrysothamnus viscidiflorus stenophyllus	-	5.44
Juniperus osteosperma	.60	6.58

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 21A, Study no: 16

Species	Average leader growth (in)	
	'02	'07
Artemisia tridentata vaseyana	2.2	1.9
Cercocarpus montanus	-	3.0

POINT-QUARTER TREE DATA --

Management unit 21A, Study no: 16

Species	Trees per Acre	
	'02	'07
Juniperus osteosperma	52	43

Average diameter (in)	
'02	'07
3.9	7.5

BASIC COVER --

Management unit 21A, Study no: 16

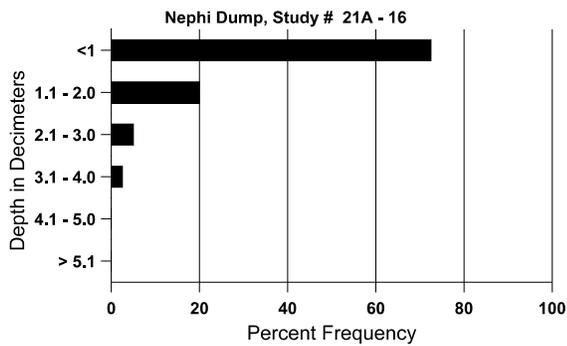
Cover Type	Average Cover %				
	'83	'89	'97	'02	'07
Vegetation	.25	5.00	38.75	41.17	47.71
Rock	13.25	13.00	9.50	10.58	8.03
Pavement	10.00	16.75	18.19	12.17	12.38
Litter	59.00	50.75	39.46	30.07	31.27
Cryptogams	4.00	4.50	3.96	14.77	4.36
Bare Ground	13.50	10.00	7.75	16.69	11.03

SOIL ANALYSIS DATA --

Herd Unit 21A, Study no: 16, Nephi Dump

Effective rooting depth (in)	Temp °F (depth)	pH	Clay loam			%OM	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
9.1	71.0 (10.7)	6.9	42.0	27.4	30.6	2.9	7.7	284.8	.7

Stoniness Index



PELLET GROUP DATA --

Management unit 21A, Study no: 16

Type	Quadrat Frequency		
	'97	'02	'07
Rabbit	22	5	51
Elk	-	-	1
Deer	17	12	8
Cattle	8	1	9

Days use per acre (ha)	
'02	'07
-	-
-	-
31 (76)	18 (45)
7 (16)	24 (59)

BROWSE CHARACTERISTICS --
Management unit 21A, Study no: 16

		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 vaseyana</i>												
83	3400	-	300	2200	900	-	36	0	26	-	8	22/24
89	2766	-	-	1700	1066	-	35	14	39	4	18	34/30
97	1920	60	100	1440	380	540	38	0	20	8	28	24/33
02	2220	-	20	1220	980	420	32	9	44	14	15	24/31
07	1740	20	-	920	820	520	24	14	47	24	28	30/36
<i>Cercocarpus montanus</i>												
83	0	-	-	-	-	-	0	0	0	-	0	-/-
89	0	-	-	-	-	-	0	0	0	-	0	-/-
97	0	-	-	-	-	-	0	0	0	-	0	-/-
02	20	-	-	-	20	-	0	0	100	100	100	-/-
07	0	-	-	-	-	-	0	0	0	-	0	-/-
<i>Chrysothamnus nauseosus</i>												
83	100	-	-	100	-	-	0	0	0	-	0	26/27
89	100	-	-	100	-	-	33	0	0	-	0	19/22
97	40	-	-	-	40	-	0	0	100	-	0	-/-
02	20	-	-	-	20	-	0	0	100	-	0	42/74
07	20	-	-	-	20	-	0	0	100	-	100	23/66
<i>Chrysothamnus viscidiflorus stenophyllus</i>												
83	399	-	33	300	66	-	0	0	17	-	0	18/20
89	733	-	-	700	33	-	0	0	5	-	5	13/14
97	1780	-	40	1580	160	20	0	0	9	1	2	17/18
02	2380	-	60	1780	540	100	0	0	23	7	7	16/22
07	1820	20	-	800	1020	20	2	0	56	13	14	16/24
<i>Cowania mexicana stansburiana</i>												
83	166	-	-	166	-	-	40	0	0	-	0	27/25
89	133	-	-	100	33	-	0	100	25	25	25	22/25
97	40	-	-	20	20	-	0	100	50	-	0	64/66
02	0	-	-	-	-	-	0	0	0	-	0	58/37
07	0	-	-	-	-	-	0	0	0	-	0	53/58

		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>Gutierrezia sarothrae</i>												
83	1166	-	333	833	-	-	0	0	0	-	0	15/15
89	2532	-	133	2266	133	-	0	0	5	3	3	10/9
97	1920	120	400	1500	20	40	0	0	1	1	1	11/11
02	680	-	20	400	260	660	0	0	38	38	38	7/8
07	140	20	-	140	-	-	0	0	0	-	0	9/10
<i>Juniperus osteosperma</i>												
83	33	-	33	-	-	-	0	0	-	-	0	-/-
89	66	-	66	-	-	-	0	0	-	-	0	-/-
97	20	-	-	20	-	-	0	0	-	-	0	-/-
02	20	-	-	20	-	-	0	0	-	-	0	-/-
07	20	-	-	20	-	-	0	0	-	-	0	-/-
<i>Leptodactylon pungens</i>												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	10/18
<i>Purshia tridentata</i>												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	11/16
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	-/-