

Trend Study 16C-12-07

Study site name: Manti Dump.

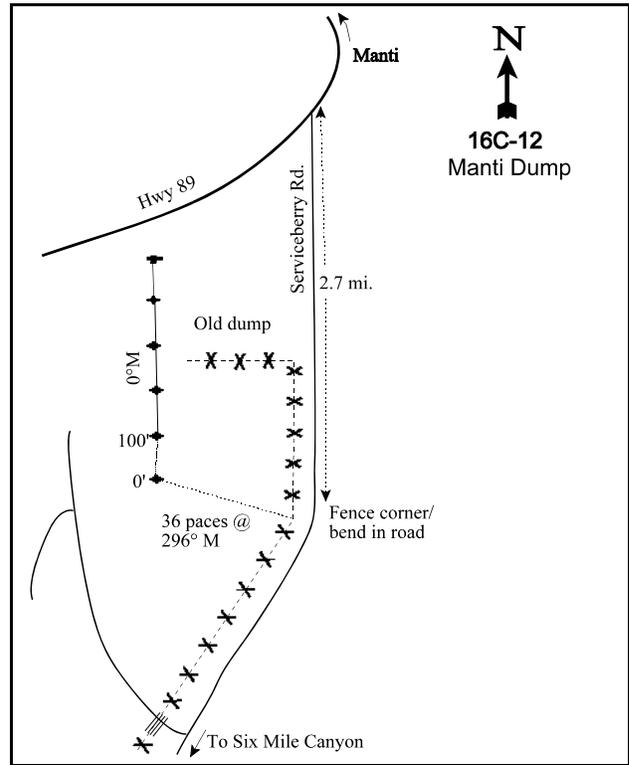
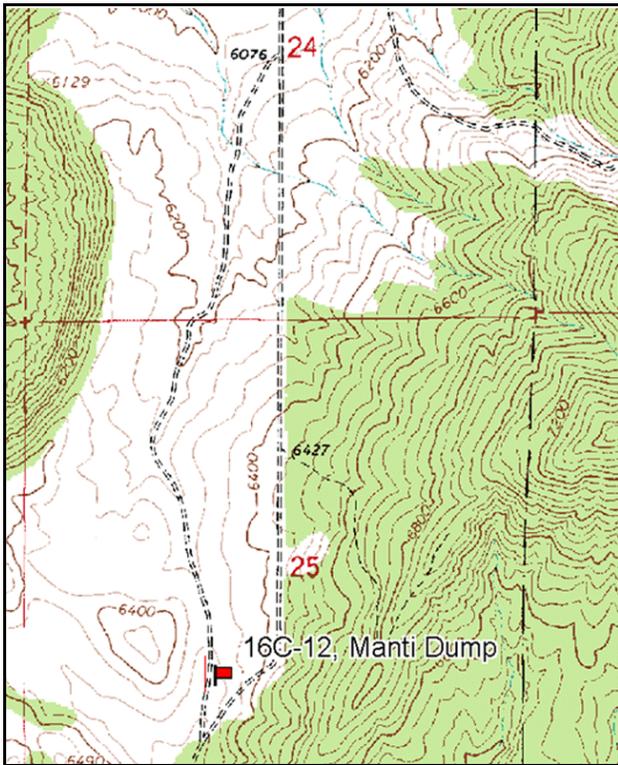
Vegetation type: Chained, Seeded P-J.

Compass bearing: frequency baseline 0 degrees magnetic.

Frequency belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft). Rebar: belt 5 on 3ft.

LOCATION DESCRIPTION

On Highway 89 south of Manti, just outside of town, the highway makes a gradual turn to the southwest. At this point, there is a graded gravel road (Serviceberry Road) that goes straight south past the old city dump and over to Six Mile Canyon. Take this road for approximately 2.7 miles to where the road turns rather sharply to the southwest. The fence on the west side of the road also makes a slight corner here and begins to head southwest. From where the fence makes a corner, walk 36 paces at 296 degrees magnetic to the 0-foot baseline stake marked by browse tag #179.



Map Name: Sterling

Diagrammatic Sketch

Township 18S, Range 2E, Section 25

GPS: NAD 83, UTM 12S 444177 E 4341038 N

DISCUSSION

Manti Dump - Trend Study No. 16C-12

Study Information

This study is on Utah Division of Wildlife Resources land south of the old Manti dump. It samples a Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) range type that was part of the east Manti Dump chain and seeding project completed in 1961 [elevation: 6,320 feet (1,926 m), slope: 10%-12%, aspect: southwest]. There is little evidence of the chaining except for a few remnant tree trunks on the slopes above the study. It usually receives 1-2 feet (0.3-0.6 m) of snow, yet it still receives moderately heavy use by wintering deer. Elk use is light in most years. From the pellet group transect, deer use was estimated at 37 days use/acre (93 ddu/ha) in 2002 and 5 days use/acre (13 ddu/ha) in 2007. The cattle estimates were 2 days/use acre (5 cdu/ha) in 2002 and 2007. Sheep estimates were 25 days use/acre (61 sdu/ha) in 2007. The seeded grasses have been utilized by sheep, which graze the area in the spring. Several deer antler sheds have also been observed during past readings.

Soil

The soil is in the Fontreen series that consists of very deep, well-drained, moderately-rapidly permeable soils that formed in alluvium and colluvium from limestone, sandstone, chert, and shale. Fontreen soils are on alluvial fans, hillslopes and mountain slopes (USDA-NRCS 2007). The soil has a clay loam texture with a neutral reactivity (pH of 7.3). The combined relative cover of vegetation and litter has been 59%-64% since 1997, providing good protection for the soils from high intensity summer storms. The combined relative cover of pavement and rock was 32% in 1997, 28% in 2002, and 18% in 2007. Relative bare ground cover was low at 5%-8% in 1997 and 2002, and increased to 16% in 2007. Soils have a severe erosion hazard on the steeper slopes above the study as evidenced by active sheet and rill erosion. In 1989, there was evidence of soil movement and plant pedestalling. Since 1989, erosion appears to have decreased. The erosion condition was classified as stable in 2002 and 2007.

Browse

The most abundant preferred browse is Wyoming big sagebrush. Canopy cover of Wyoming big sagebrush was 6% in 2002 and 7% in 2007. Its density was 4,066 plants/acre (10,043 plants/ha) in 1989, 2,360 plants/acre (5,829 plants/ha) in 1997, 1,900 plants/acre (4,693 plants/ha) in 2002, and 1,220 plants/acre (3,013 plants/ha) in 2007. The 1997 decline is due in part to the increased sample area. This larger sample gives more accurate estimates for shrub populations that have clumped and/or discontinuous distributions. The decline is also partially due to an increase in the proportion of dying plants from 21% of the population in 1997 to 39% in 2007. The recruitment of young has been low at 0%-5% of the population. Decadence has been high and ranged from 36% of the population to 68%. Plants showing poor vigor have increased from 0% of the population in 1989 to 46% in 2007. Browse use has been moderate-heavy. Lower than average precipitation periods in the late 1980's as well as 2000-2002 (Utah Climate Summaries 2007) may have contributed to low recruitment, high decadence, and increased poor vigor of the Wyoming big sagebrush. Moderate-heavy browsing for an extended period of time may have played a role as well. The average annual leader growth was 1.1 inches (2.8 cm) in 2002 and 0.9 inch (2.4 cm) in 2007.

The presence of black sagebrush (*Artemisia nova*) indicates areas of shallow, and dry stony soil (Zamora and Tueller 1973). Canopy cover of black sagebrush increased from 1% in 2002 to 2% in 2007. The black sagebrush density was 1,132 plants/acre (2,796 plants/ha) in 1989, 400 plants/acre (988 plants/ha) in 1997, 800 plants/acre (1,976 plants/ha) in 2002, and 500 plants/acre (1,235 plants/ha) in 2007. As with Wyoming big sagebrush, the 1997 decline in density is mostly due to the enlarged sampling area which more accurately estimates shrub populations. Young plants increased from 18% of the population in 1989 to 20% in 1997, and decreased to 4% by 2007. Decadence increased from 5%-6% of the population in 1989 and 1997 to 40% in 2007. Plants with poor vigor and classified as dying have increased from 0% of the population in 1989 to

16% in 2007. Browse use has been mostly light-moderate.

Canopy cover of Utah juniper (*Juniperus osteosperma*) increased from 1% in 2002 to 4% in 2007. The point-centered quarter data estimate of juniper density was 32 trees/acre (79 trees/ha) in 1997, 40 trees/acre (99 trees/ha) in 2002, and 46 trees/acre (114 trees/ha) in 2007. The average trunk diameter was estimated at 3.9 inches (9.9 cm) in 1997, 2.8 inches (7 cm) in 2002, and 4.7 inches (11.9 cm) in 2007. Canopy cover of pinyon pine (*Pinus edulis*) was 0% in 2002 and 2% in 2007. The pinyon density was estimated at 7 trees/acre (17 trees/ha) in 1997, 11 trees/acre (27 trees/ha) in 2002, and 28 trees/acre (69 trees/ha) in 2007. The average trunk diameter was 4.4 inches (11.2 cm) in 1997, 3.1 inches (7.8 cm) in 2002, and 5.5 inches (14 cm) in 2007.

Herbaceous Understory

The herbaceous understory has displayed low diversity and is dominated by crested wheatgrass (*Agropyron cristatum*) and intermediate wheatgrass (*Agropyron intermedium*), which are found mostly in the protection of the sagebrush crowns. Crested wheatgrass provided 8%-9% of the total ground cover in 1997 and 2002, and 15% cover in 2007. Intermediate wheatgrass provided 3%-6% of the total ground cover in all sample years. Sandberg bluegrass (*Poa secunda*), bottlebrush squirreltail (*Sitanion hystrix*), and Indian ricegrass (*Oryzopsis hymenoides*) have also been sampled in very low frequencies. Cheatgrass is present, but its density is very low. It has provided less than 1% of the total ground cover in all sample years. Bulbous bluegrass (*Poa bulbosa*), which has a life cycle similar to that of cheatgrass (Stewart and Hull 1949), was sampled in three quadrats in 2002 and 11 quadrats in 2007.

There are very few forbs. A total of three perennial forb species and four annual forb species have been sampled since 1989. The dominant forb is bur buttercup (*Ranunculus testiculatus*). It has provided 1%-2% of the total ground cover since 1997. It is allopathic, and prevents the seed germination of many native species (Buchanan et al. 1978).

1997 TREND ASSESSMENT

The browse trend is down. The density of Wyoming big sagebrush declined 42%. The recruitment of young decreased from 5% of the population to 3%, and decadence decreased from 38% to 36% of the population. Plants classified as having poor vigor increased to from 0% of the population 23% of the population. Browse use was heavy-moderate. The density of black sagebrush decreased 65%. The recruitment of young increased from 18% of the population to 20%, and decadence changed little, decreasing from 6% to 5% of the population. Plants classified as having poor vigor increased from 0% to 5%. Browse use remained light-moderate. The grass trend is up. The sum of nested frequency for perennial grass increased 29%. The forb trend is stable. There were very few forbs, and only one perennial forb was measured. Bur buttercup had a quadrat frequency of 90%. The Desirable Components Index (DCI) score was good due to moderate preferred browse cover with low decadence and recruitment, excellent perennial grass cover, little annual grass cover, and very little perennial forb cover.

winter range condition (DCI) - good (52) Low potential scale

browse - down (-2)

grass - up (+2)

forb - stable (0)

2002 TREND ASSESSMENT

The browse trend is slightly down. The overall density for sagebrush changed little, however, the trend was determined by decreases in recruitment, increases in decadence, and declines in vigor. The density of Wyoming big sagebrush decreased 19%. The recruitment of young decreased to 0% of the population, and decadent plants increased to 68%. Plants classified as having poor vigor and dying increased to 35% of the population. Browse use remained moderate-heavy. The density of black sagebrush increased two-fold. The recruitment of young decreased to 8% of the population, and decadence increased to 25%. Plants classified as having poor vigor and dying increased to 13% of the population. Browse use remained light-moderate. The grass trend is stable. The sum of nested frequency for perennial grass decreased 15%. The nested frequency

for cheatgrass significantly declined 94%. Bulbous bluegrass was sampled for the first time, though only in 3% of the quadrats. The forb trend is stable. The sum of nested frequency for perennial and annual forbs remained stable. Only two forbs were sampled. The DCI score declined to fair mainly due to increased browse decadence, and very little recruitment of young browse.

winter range condition (DCI) - fair (36) Low potential scale
browse - slightly down (-1) grass - stable (0) forb - stable (0)

2007 TREND ASSESSMENT

The browse trend is down. The density of Wyoming big sagebrush decreased 36%. There was no recruitment of young, and decadence decreased to 62% of the population. Plants classified as having poor vigor increased to 46% of the population. Browse use was mostly moderate-heavy. The density of black sagebrush decreased 38%. The recruitment of young decreased to 4% of the population, and decadence increased to 40%. The plants classified as having poor vigor and dying increased to 16% of the population. Browse use was mostly light-moderate. The grass trend is down. The sum of nested frequency for perennial grass increased 17%. Crested wheatgrass increased significantly in nested frequency. However, the nested frequencies of cheatgrass and bulbous bluegrass also significantly increased. Additionally, Japanese brome (*Bromus japonicus*) was sampled for the first time, with a quadrat frequency of 3%. The forb trend is stable. The sum of nested frequency for perennial forbs remained stable. Only one perennial forb individual was sampled. The nested frequency for bur buttercup significantly decreased. The DCI score remained fair.

winter range condition (DCI) - fair (34) Low potential scale
browse - down (-2) grass - down (-2) forb - stable (0)

HERBACEOUS TRENDS --
Management unit 16C, Study no: 12

Type	Species	Nested Frequency				Average Cover %		
		'89	'97	'02	'07	'97	'02	'07
G	Agropyron cristatum	_a 174	_{ab} 225	_a 193	_b 242	8.59	8.35	14.82
G	Agropyron intermedium	_{ab} 168	_b 183	_{ab} 158	_a 131	5.50	5.27	3.00
G	Bromus japonicus (a)	-	-	-	4	-	-	.01
G	Bromus tectorum (a)	-	_b 67	_a 4	_c 116	.43	.01	.63
G	Oryzopsis hymenoides	-	_a 2	-	_a -	.03	-	.00
G	Poa bulbosa	-	-	_a 4	_b 30	-	.04	.18
G	Poa secunda	_a 3	_{ab} 27	_b 38	_b 50	.21	.29	.82
G	Sitanion hystrix	_{ab} 13	_b 24	-	_a 5	.31	-	.01
Total for Annual Grasses		0	67	4	120	0.43	0.00	0.64
Total for Perennial Grasses		358	461	393	458	14.64	13.97	18.84
Total for Grasses		358	528	397	578	15.08	13.98	19.49
F	Alyssum alyssoides (a)	-	_a 3	-	_b 21	.00	-	.09
F	Collinsia parviflora (a)	-	-	-	2	-	-	.00
F	Descurainia pinnata (a)	-	-	-	1	-	-	.00
F	Penstemon sp.	1	-	-	-	-	-	-
F	Phlox longifolia	-	-	2	-	-	.00	-

Type	Species	Nested Frequency				Average Cover %		
		'89	'97	'02	'07	'97	'02	'07
F	Ranunculus testiculatus (a)	-	_b 251	_b 253	_a 171	1.44	1.57	1.33
F	Sphaeralcea coccinea	-	_a 2	-	_a 1	.00	-	.00
Total for Annual Forbs		0	254	253	195	1.44	1.57	1.44
Total for Perennial Forbs		1	2	2	1	0.00	0.00	0.00
Total for Forbs		1	256	255	196	1.45	1.58	1.44

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

BROWSE TRENDS --

Management unit 16C, Study no: 12

Type	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	Artemisia nova	16	20	17	1.55	1.00	.45
B	Artemisia tridentata wyomingensis	66	58	42	10.78	8.16	5.01
B	Atriplex canescens	2	0	0	-	-	-
B	Chrysothamnus viscidiflorus stenophyllus	2	0	2	-	-	-
B	Gutierrezia sarothrae	23	23	23	.41	1.19	.25
B	Juniperus osteosperma	3	3	3	1.97	1.54	1.67
B	Pinus edulis	0	0	0	.38	.63	-
Total for Browse		112	104	87	15.10	12.52	7.40

CANOPY COVER, LINE INTERCEPT --

Management unit 16C, Study no: 12

Species	Percent Cover	
	'02	'07
Artemisia nova	1.03	2.08
Artemisia tridentata wyomingensis	6.46	6.90
Gutierrezia sarothrae	1.66	.70
Juniperus osteosperma	.81	3.88
Pinus edulis	-	1.63

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 16C, Study no: 12

Species	Average leader growth (in)	
	'02	'07
Artemisia tridentata wyomingensis	1.1	0.9

POINT-QUARTER TREE DATA --
Management unit 16C, Study no: 12

Species	Trees per Acre		Average diameter (in)	
	'02	'07	'02	'07
Juniperus osteosperma	40	46	2.8	4.7
Pinus edulis	11	28	3.1	5.5

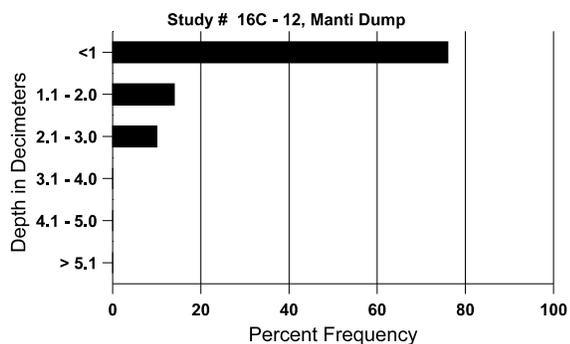
BASIC COVER --
Management unit 16C, Study no: 12

Cover Type	Average Cover %			
	'89	'97	'02	'07
Vegetation	9.00	29.62	28.17	31.17
Rock	1.00	1.15	2.36	.59
Pavement	29.00	31.22	30.13	18.81
Litter	55.00	31.75	38.28	37.74
Cryptogams	.75	3.03	6.03	1.79
Bare Ground	5.25	4.92	8.87	17.45

SOIL ANALYSIS DATA --
Herd Unit 16C, Study no: 12, Manti Dump

Effective rooting depth (in)	Temp °F (depth)	pH	Clay loam			%OM	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
12.2	63.0 (14.2)	7.3	38.4	35.1	26.6	3.1	8.1	137.6	.6

Stoniness Index



PELLET GROUP DATA --

Management unit 16C, Study no: 12

Type	Quadrat Frequency		
	'97	'02	'07
Sheep	11	-	-
Rabbit	7	25	45
Elk	3	-	7
Deer	53	44	16
Cattle	-	1	-

Days use per acre (ha)	
'02	'07
-	25 (61)
-	-
-	-
37 (93)	5 (13)
2 (5)	2 (4)

BROWSE CHARACTERISTICS --

Management unit 16C, Study no: 12

		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 nova</i>												
89	1132	-	200	866	66	-	53	0	6	-	0	16/25
97	400	-	80	300	20	-	55	0	5	5	5	17/27
02	800	-	60	540	200	40	18	3	25	13	13	13/24
07	500	-	20	280	200	40	36	12	40	16	16	15/26
<i>Artemisia tridentata wyomingensis</i>												
89	4066	266	200	2333	1533	-	25	70	38	-	0	27/29
97	2360	-	80	1420	860	800	31	62	36	21	23	42/64
02	1900	-	-	600	1300	980	53	23	68	35	35	20/33
07	1220	-	-	460	760	840	31	39	62	39	46	21/36
<i>Atriplex canescens</i>												
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	40	-	20	20	-	-	0	50	-	-	0	33/43
02	0	-	-	-	-	80	0	0	-	-	0	49/61
07	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Chrysothamnus viscidiflorus stenophyllus</i>												
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	60	-	-	60	-	-	0	100	-	-	0	8/11
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	40	-	-	40	-	-	0	50	-	-	0	-/-
<i>Ephedra viridis</i>												
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	21/35
07	0	-	-	-	-	-	0	0	-	-	0	20/19

		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>												
89	199	-	66	133	-	-	0	0	0	-	0	12/6
97	3100	60	720	2380	-	-	0	0	0	-	0	8/7
02	3020	-	-	1220	1800	360	0	0	60	20	21	4/7
07	1680	-	20	1620	40	20	0	0	2	2	2	7/8
<i>Juniperus osteosperma</i>												
89	0	66	-	-	-	-	0	0	-	-	0	-/-
97	60	-	20	40	-	-	0	0	-	-	0	-/-
02	60	-	-	60	-	40	0	0	-	-	0	-/-
07	60	-	-	60	-	-	0	0	-	-	0	-/-
<i>Opuntia sp.</i>												
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	5/14