

Trend Study 16C-1-07

Study site name: Manti Face Chaining .

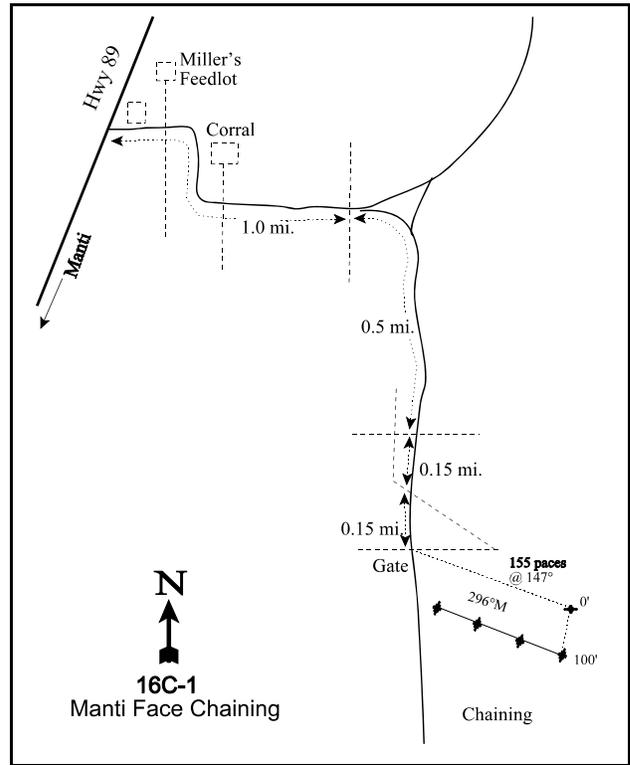
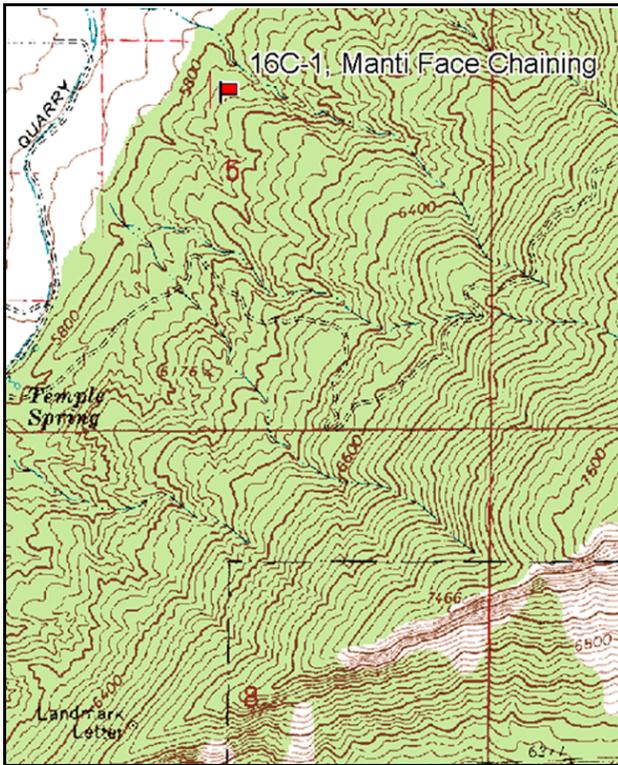
Vegetation type: Chained, Seeded P-J .

Compass bearing: frequency baseline 192 degrees magnetic (line 2-4 @ 296°M).

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

LOCATION DESCRIPTION

Go north out of Manti on Highway 89 about 1 mile or so to a feedlot on the right (east) side of the road. Turn right on the south side of these corrals. Go up this county road 1 mile, following the main road around the upper corrals, to an old fence line. Just past the fence, bear right off the main road onto a faint road. Follow this road 0.5 miles to the first DWR fence. Go through this small section of DWR land 0.15 miles to another fence. Go 0.15 miles to another DWR fence. Stop at this gate. From here, the study site is up the hill in the chaining. Walk 155 paces at 139 degrees magnetic to the 0-foot baseline stake, which is marked by browse tag #9043.



Map Name: Ephraim

Diagrammatic Sketch

Township 18S , Range 3E , Section 5

GPS: NAD 83, UTM 12S 447653 E 4348004 N

DISCUSSION

Manti Face Chaining - Trend Study No. 16C-1

Study Information

This study is located on Utah Division of Wildlife Resources property northeast of Manti [elevation: 5,920 feet (1,804 m), slope: 28%, aspect: west]. It was placed on one of the many chainings along the Ephraim/Manti front that are adjacent to cultivated fields. Because the project was done when chainings were treated as large rectangular areas, protective cover is lacking on the treated area and there is limited sign of deer and elk use. The deer pellet group data estimates were 63 days use/acre (155 ddu/ha) in 2002 and 28 days use/acre (69 ddu/ha) in 2007. The elk pellet group data estimates were less than 1 day use/acre (2 edu/ha) in 2002 and 11 days use/acre (28 edu/ha) in 2007. The sheep pellet group data estimates were 1 day use/acre (3 sdu/ha) in 2002. The cattle use estimates were 2 days use/acre (5 cdu/ha) in 2002 and 9 days use/acre (22 cdu/ha) in 2007. The deer and elk pellets sampled in 2002 and 2007 appeared to be primarily from winter or spring and the sampled cattle pats and sheep pellets appeared to be from the previous year.

Soil

The soil is in the Sanpete series, which consists of very deep, well to somewhat excessively drained, moderately-rapidly permeable soils that formed in alluvium dominantly from limestone, sandstone, and shale (USDA-NRCS 2007). The soil has a loam texture and is neutral to slightly alkaline reactivity (pH of 7.3). Rock and pavement are abundant on the surface and throughout the profile. Combined relative rock and pavement cover was 30%-32% from 1997 to 2007. Combined relative vegetation and litter cover was 53%-55% from 1997 to 2007. Relative bare ground cover was low at 14% or less since 1997. This area was chained partly to reduce the erosion potential. In 2002, the erosion condition was classified as stable. In 2007, the erosion condition was classified as slight due to pedestalling around vegetation, flow patterns and slight transportation of soil and surface litter.

Browse

There is limited browse forage available on the chaining, and there are few seeded species. A few large, robust fourwing saltbush (*Atriplex canescens*) and an occasional small antelope bitterbrush (*Purshia tridentata*) have been found within the planting rows left by seed dribblers. Black sagebrush (*Artemisia nova*) is also present, but accounted for less than 1% of the canopy cover in 2002 and 2007. Black sagebrush density was estimated at 832 plants/acre (2,055 plants/ha) in 1989, 500 plants/acre (1,235 plants/ha) in 1997, 680 plants/acre (1,680 plants/ha) in 2002, and 340 plants/acre (840 plants/ha) in 2007. Young plants comprised 8% of the population in 1989, 48% in 1997, 62% in 2002, and 41% in 2007. Decadence was 20% in 1989, 0% in 1997, 6% in 2002 and 18% in 2007. Plants classified as having poor vigor has comprised of 0%-12% of the population since 1989. Utilization was mostly light-moderate in all sample years. Average annual leader growth was 1.4 inches (3.6 cm) in 2002 and 1.2 inches (3 cm) in 2007.

During the initial sampling in 1989, surviving Utah juniper (*Juniperus osteosperma*) appeared to be rapidly increasing in size in the treated area. From point-center quarter data juniper density was estimated at 183 trees/acre (452 trees/ha) in 1997, 118 trees/acre (291 trees/ha) in 2002, and 124 trees/acre (306 trees/ha) in 2007. Average juniper trunk diameter was 1.5 inches (3.8 cm) in 1997, 1.8 inches (4.6 cm) in 2002, and 2.6 inches (6.6 cm) in 2007. Estimated pinyon pine (*Pinus edulis*) density was 6 trees/acre (15 trees/ha) in 1997, 21 trees/acre (52 trees/ha) in 2002, and 22 pinyon/acre (54 trees/ha) in 2007. Pinyon average trunk diameter was 2.1 inches (5.3 cm) in 1997, 1.3 inches (3.3 cm) in 2002, and 1.9 inches (4.8 cm) in 2007.

Herbaceous Understory

Grasses are the dominant component in the community. Both seeded and native species are abundant. The most abundant grass is crested wheatgrass (*Agropyron cristatum*). It provided 6% cover in 1997 and 11% cover in 2002 and 2007. Intermediate wheatgrass (*Agropyron intermedium*) provided 4% cover in 1997 and

3% cover in 2002 and 2007. Bluebunch wheatgrass (*Agropyron spicatum*) cover was 1% in 1997, 5% in 2002, and 3% in 2007. Sandberg bluegrass (*Poa secunda*) provided 2% cover in 1997, 1% cover in 2002, and 5% cover in 2007. Though not dominant in previous years, cheatgrass (*Bromus tectorum*) cover increased from 1% in 1997 and nearly 0% in 2002 to 4% cover in 2007. Less abundant species include Indian ricegrass (*Oryzopsis hymenoides*), sheep fescue (*Festuca ovina*), and bottlebrush squirreltail (*Sitanion hystrix*). Due to spring drought conditions in 2002 (Utah Climate Summaries 2007), grass identification was difficult because there was minimal production and seedhead development.

Forbs are limited, with annual species being more abundant than perennials. Bur buttercup (*Ranunculus testiculatus*), a weed that has allelopathic characteristics (Buchanan et al. 1978), was the most abundant species. It provided 4% cover in 1997, less than 1% cover in 2002, and 5% cover in 2007. In 2002, most of the understory biomass was desiccated. Seeded species such as alfalfa (*Medicago sativa*) and small burnet (*Sanguisorba minor*) have not been sampled since 1997. Field bindweed (*Convolvulus arvensis*), a noxious weed, has been present since 1997, but has only been sampled in 10% or less of the quadrats.

1997 TREND ASSESSMENT

The browse trend is stable. The browse component is low and comprised 2% of the ground cover, with few preferred browse species that contribute little browse for wintering big game. The density of black sagebrush decreased 40%, but the recruitment of young into the population increased from 8% to 48%. Percent decadence decreased from 20% to 0%, and plants classified as having poor vigor improved from 12% of the population to 0%. The grass trend is stable. The sum of nested frequency values for perennial grasses remained stable. The nested frequency for crested wheatgrass significantly increased and, significantly decreased for bottlebrush squirreltail. The trend for forbs is stable. The sum of the nested frequency for perennial forbs was unchanged. Bur buttercup provided 76% of the total forb cover. Field bindweed, a noxious weed, was also sampled for the first time. The Desirable Components Index (DCI) score was fair due to high perennial grass cover and low annual grass cover, but low cover and recruitment of preferred browse and low perennial forb cover.

winter range condition (DCI) - fair (29) Low potential scale
browse - stable (0) grass -stable (0) forb - stable (0)

2002 TREND ASSESSMENT

The trend for browse is slightly up. Black sagebrush density increased 36%. The recruitment of young increased to 62% of the population. Percent decadence increased slightly to 6% of the population, and plants classified with poor vigor increased to 3%. Fourwing saltbush and antelope bitterbrush had low densities of 40 plants/acre (99 plants/ha) and 60 plants/acre (148 plants/ha), respectively, and all of the plants were vigorous. The grass trend is stable. The sum of nested frequency of perennial grasses changed little, while the sum of the nested frequency of annual grasses decreased 84%. Additionally, perennial grasses increased from 15% of the ground cover to 22%. The nested frequency of cheatgrass significantly decreased. The trend for forbs is slightly down. The sum of nested frequency of perennial forbs decreased 79%. Alfalfa, the dominant perennial forb in previous years, was not sampled. The nested frequency of bur buttercup significantly decreased, while the nested frequency for field bindweed remained stable. The DCI score remained fair.

winter range condition (DCI) - fair (28) Low potential scale
browse - slightly up (+1) grass - stable (0) forb - slightly down (-1)

2007 TREND ASSESSMENT

The trend for browse is down. Black sagebrush density decreased 50%. Recruitment also decreased to 41%, and percent decadence increased to 18% of the population. Plants classified with poor vigor increased to 12% of the population, and all of these plants were classified as dying. The trend for grass is slightly down. The sum of nested frequency of perennial grasses changed little, while the sum of nested frequency of annual

grasses greatly increased. Cheatgrass nested frequency significantly increased, and it increased from nearly 0% to 4% ground cover. The forb trend is down. The sum of nested frequency for perennials forbs increased more than two-fold. However, the sum of nested frequency for annual forbs increased four-fold. Bur buttercup nested frequency significantly increased, and provided 96% of the total forb cover, and 5% ground cover. Field bindweed nested frequency and cover changed little. The DCI score declined to fair-poor due to and increase in annual grass cover.

winter range condition (DCI) - fair-poor (26) Low potential scale
browse - down (-2) grass - slightly down (-1) forb - down (-2)

HERBACEOUS TRENDS --
Management unit 16C, Study no: 1

Type	Species	Nested Frequency				Average Cover %		
		'89	'97	'02	'07	'97	'02	'07
G	Agropyron cristatum	a125	b182	b216	b202	5.77	10.67	11.07
G	Agropyron intermedium	a118	a128	a101	a98	4.05	3.20	3.22
G	Agropyron spicatum	a47	a43	a64	a67	1.23	5.36	2.57
G	Bromus inermis	1	-	-	-	-	-	-
G	Bromus japonicus (a)	-	a5	-	a8	.15	-	.02
G	Bromus tectorum (a)	-	b81	a14	c205	.71	.05	3.96
G	Elymus junceus	b18	b26	-	a5	1.39	-	.15
G	Festuca ovina	b21	ab14	ab16	a6	.25	.91	.01
G	Oryzopsis hymenoides	a1	a6	-	a2	.41	-	.03
G	Poa secunda	a129	ab158	a137	b194	1.60	1.41	5.54
G	Sitanion hystrix	c130	b28	ab7	a5	.39	.07	.06
Total for Annual Grasses		0	86	14	213	0.87	0.05	3.98
Total for Perennial Grasses		590	585	541	579	15.11	21.64	22.68
Total for Grasses		590	671	555	792	15.98	21.69	26.67
F	Alyssum alyssoides (a)	-	a1	-	b137	.00	-	.64
F	Arabis sp.	1	-	-	-	-	-	-
F	Arenaria fendleri	-	a3	-	a2	.00	-	.00
F	Astragalus sp.	a3	-	-	a2	-	-	.00
F	Camelina microcarpa (a)	-	a31	-	a41	.09	-	.12
F	Chaenactis douglasii	-	6	-	-	.01	-	-
F	Chenopodium fremontii (a)	-	1	-	-	.00	-	-
F	Chorispora tenella (a)	-	3	-	-	.03	-	-
F	Convolvulus arvensis	-	a13	a11	a19	.40	.07	.17
F	Collinsia parviflora (a)	-	-	1	-	-	.00	-
F	Cryptantha sp.	a14	a21	-	a11	.22	-	.02
F	Descurainia pinnata (a)	-	a14	-	a30	.03	-	.07
F	Draba sp. (a)	-	3	-	-	.00	-	-

Type	Species	Nested Frequency				Average Cover %		
		'89	'97	'02	'07	'97	'02	'07
F	<i>Erodium cicutarium</i> (a)	-	_a 1	-	_a 6	.00	-	.01
F	<i>Galium aparine</i> (a)	-	1	-	-	.00	-	-
F	<i>Lappula occidentalis</i> (a)	-	3	-	-	.00	-	-
F	<i>Lactuca serriola</i>	_a 3	_a 3	-	-	.00	-	-
F	<i>Medicago sativa</i>	_a 23	_a 12	-	-	.29	-	-
F	<i>Penstemon pachyphyllus</i>	3	-	-	-	-	-	-
F	<i>Phlox hoodii</i>	_a 7	_a 8	_a 1	_a 4	.04	.03	.03
F	<i>Phlox longifolia</i>	-	-	1	-	-	.00	-
F	<i>Ranunculus testiculatus</i> (a)	-	_b 297	_a 131	_c 335	3.84	.46	5.11
F	<i>Sanguisorba minor</i>	8	-	-	-	-	-	-
F	<i>Sisymbrium</i> sp. (a)	7	-	-	-	-	-	-
F	<i>Streptanthus cordatus</i>	_a 3	_a 1	-	-	.00	-	-
F	<i>Taraxacum officinale</i>	-	-	3	-	-	.00	-
F	<i>Tragopogon dubius</i>	_b 19	_{ab} 14	_a 1	_{ab} 7	.07	.00	.01
Total for Annual Forbs		7	355	132	549	4.02	0.47	5.96
Total for Perennial Forbs		84	81	17	45	1.05	0.11	0.25
Total for Forbs		91	436	149	594	5.08	0.58	6.21

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

BROWSE TRENDS --

Management unit 16C, Study no: 1

Type	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	<i>Artemisia nova</i>	12	7	7	.03	.15	.30
B	<i>Atriplex canescens</i>	2	2	1	-	-	-
B	<i>Ephedra viridis</i>	2	1	0	.03	.00	-
B	<i>Gutierrezia sarothrae</i>	2	7	3	.09	.33	-
B	<i>Juniperus osteosperma</i>	11	11	11	2.03	2.55	1.75
B	<i>Purshia tridentata</i>	2	3	2	.03	.00	.00
Total for Browse		31	31	24	2.22	3.05	2.06

CANOPY COVER, LINE INTERCEPT --

Management unit 16C, Study no: 1

Species	Percent Cover	
	'02	'07
Artemisia nova	.38	.43
Gutierrezia sarothrae	.10	-
Juniperus osteosperma	1.31	2.86

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 16C, Study no: 1

Species	Average leader growth (in)	
	'02	'07
Artemisia nova	1.4	1.2

POINT-QUARTER TREE DATA --

Management unit 16C, Study no: 1

Species	Trees per Acre		Average diameter (in)	
	'02	'07	'02	'07
Juniperus osteosperma	118	124	1.8	2.6
Pinus edulis	21	22	1.3	1.9

BASIC COVER --

Management unit 16C, Study no: 1

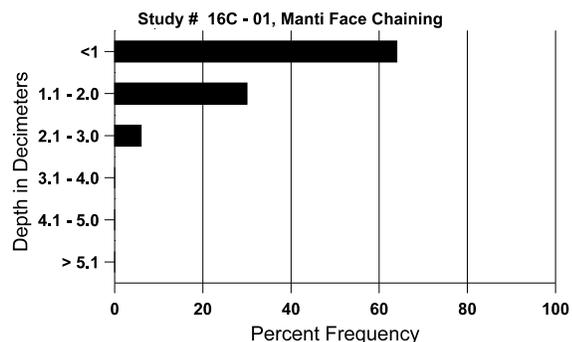
Cover Type	Average Cover %			
	'89	'97	'02	'07
Vegetation	13.50	28.21	25.92	38.96
Rock	7.00	7.33	8.05	7.76
Pavement	47.00	26.63	25.63	26.55
Litter	25.25	31.50	34.34	19.71
Cryptogams	.25	.55	3.27	4.09
Bare Ground	7.00	13.08	15.64	9.27

SOIL ANALYSIS DATA --

Herd Unit 16C, Study no: 01, Manti Face Chaining

Effective rooting depth (in)	Temp °F (depth)	pH	Loam			%OM	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
9.6	59.8 (12.4)	7.3	38.0	34.4	26.6	3.3	9.2	150.4	.5

Stoniness Index



PELLET GROUP DATA --

Management unit 16C, Study no: 1

Type	Quadrat Frequency		
	'97	'02	'07
Sheep	-	-	-
Rabbit	17	27	58
Elk	23	5	4
Deer	36	54	37
Cattle	1	-	2

Days use per acre (ha)	
'02	'07
1 (3)	-
-	-
1 (2)	11 (28)
63 (155)	28 (69)
2 (5)	9 (22)

BROWSE CHARACTERISTICS --

Management unit 16C, 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)
89	832	33	66	600	166	-	16	8	20	4	12	7/13
97	500	-	240	260	-	-	24	0	0	-	0	12/20
02	680	20	420	220	40	60	24	12	6	3	3	11/20
07	340	-	140	140	60	-	24	18	18	12	12	11/21
<i>Atriplex canescens</i>												
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	40	-	-	40	-	-	50	50	-	-	0	38/61
02	40	-	-	40	-	20	50	0	-	-	0	46/62
07	20	-	-	20	-	-	0	0	-	-	0	47/67

		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)
Chrysothamnus nauseosus albicaulis												
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	42/36
07	0	-	-	-	-	-	0	0	-	-	0	24/40
Ephedra viridis												
89	0	-	-	-	-	-	0	0	0	-	0	-/-
97	40	-	20	20	-	-	0	50	0	-	0	-/-
02	20	-	-	-	20	-	0	0	100	100	100	7/12
07	0	-	-	-	-	-	0	0	0	-	0	-/-
Gutierrezia sarothrae												
89	1765	-	166	1333	266	-	0	0	15	6	6	7/10
97	700	40	440	260	-	-	0	0	0	-	0	9/9
02	540	-	-	420	120	120	0	0	22	-	0	6/7
07	80	-	20	60	-	-	0	0	0	-	0	8/8
Juniperus osteosperma												
89	466	166	300	133	33	-	0	0	7	-	7	54/44
97	240	40	140	100	-	120	8	0	0	-	0	15/35
02	240	-	60	180	-	-	8	0	0	-	0	-/-
07	220	-	120	100	-	-	0	0	0	-	0	-/-
Pinus edulis												
89	66	66	66	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	-/-
Purshia tridentata												
89	0	-	-	-	-	-	0	0	0	-	0	-/-
97	40	20	-	40	-	-	50	50	0	-	0	6/14
02	60	-	20	40	-	-	0	67	0	-	0	6/20
07	40	-	-	20	20	-	0	100	50	50	50	4/10