

TRIANGLE MOUNTIAN - TREND STUDY NO. 25A-1-09

Vegetation Type: Chained, Seeded P-J

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 6,700 ft (2,042 m)

Aspect: Southwest

Slope: 5%-10%

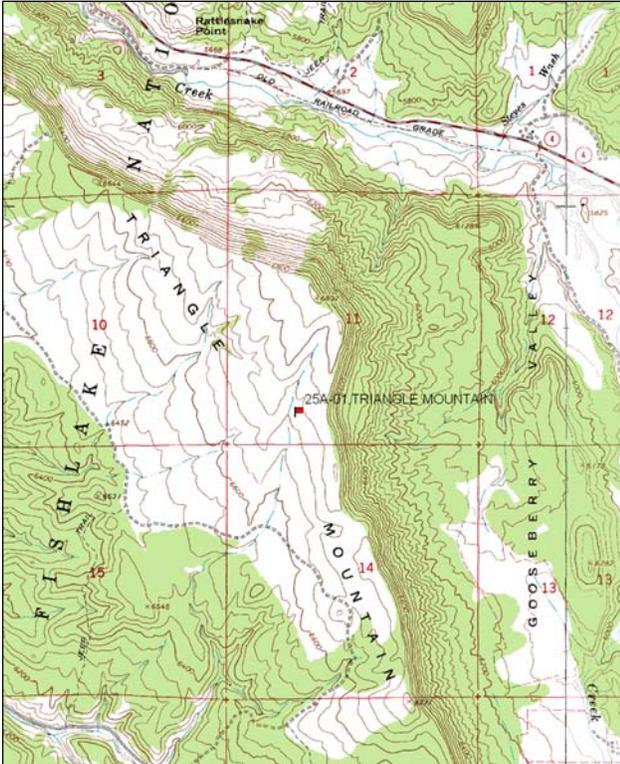
Transect bearing: 180 degrees magnetic

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

Directions:

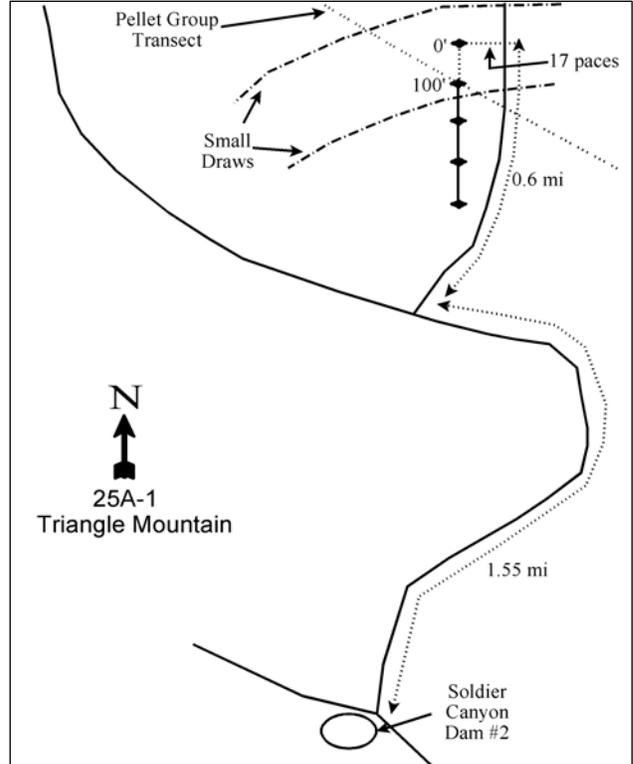
From the Gooseberry Creek Road outside Salina, take the Soldier Canyon Road west approximately 2.5 miles to Soldier Canyon Dam #2. At the dam, turn right up the road to Triangle Mountain. Go 1.55 miles to a fork. Take the right fork 0.6 miles to the top of a low rise between 2 small draws. Walk 17 paces due west of the road to the 0-foot baseline stake, which is a 4-foot rebar. A pellet group transect crosses the frequency baseline at the 100-foot mark.

Map Name: Salina, Utah



Township: 22S, Range: 1E, Section: 11

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 433160 E 4306455 N

TRIANGLE MOUNTAIN - TREND STUDY NO. 25A-1

Site Information

Site Description: This study is located on a pinyon-juniper chaining on Triangle Mountain that was done in 1970. Several small pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) trees had begun to reoccupy the site, along with seeded perennial grasses, and the area was retreated by a lop-and-scatter to remove pinyon and juniper between the 2004 and 2009 samples. As part of the Brown's Hole allotment, cattle graze from June 1 to June 15 depending on range conditions. Pellet group data has indicated deer use has decreased with each sampling since 1999 from moderate to light. Estimated elk use has fluctuated from moderate to high while cattle use has been high (Tables – Pellet Group Data).

Browse: Black sagebrush (*Artemisia nova*) is the key browse species found on this site, but it occurs in very low densities. Densities for black sagebrush have averaged 317 plants/acre since 1985 (Table - Browse Characteristics) while cover has been less than 1% since 1999 (Table - Browse Trends). Pinyon pine and Utah juniper density, as estimated by the point centered quarter method, decreased in 2009 following the lop-and-scatter treatment (Table - Point-Quarter Data). More dense stands of pinyon-juniper surround this area and provide more cover.

Herbaceous Understory: Herbaceous species account for most of the vegetation cover on this site. Perennial grasses are plentiful and provide good cover. The most common species, from highest cover, are crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*A. intermedium*) and Russian wildrye (*Elymus junceus*). Only one annual species, cheatgrass (*Bromus tectorum*), has been sampled and it occurs at low levels. Perennial forbs declined from a high of 4% cover in 1999 to less than 1% cover in subsequent years. Annual forbs have increased in cover each sample year and are dominated by pale alyssum (*Alyssum alyssoides*) (Table - Herbaceous Trends).

Soil: The soil is classified as a loam with a slightly alkaline pH (7.6) due to limestone parent material. Soil organic matter is high at 5.8% (Table - Soil Analysis Data). Protective surface cover is good and has averaged 76% since 1999. The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1985 to 1991 - up (+2):** Black sagebrush density increased three-fold to 199 plants/acre. Decadence is low and young plants make up the bulk of the population.
- **1991 to 1999 - stable (0):** Differences in density may be related to the larger sample area used in 1999; therefore, trend was determined using other parameters. Black sagebrush decadence remained minimal and recruitment of young plants was good at 38% of the population. Black sagebrush cover is very low at below 1%.
- **1999 to 2004 – slightly down (-1):** Black sagebrush density decreased 13% to 420 plants/acre while decadence has increased to 19% and no recruitment new recruitment of young sagebrush plants occurred. Cover of sagebrush is very low at below 1%.
- **2004 to 2009 - stable (0):** Black sagebrush density is unchanged, though decadence decreased to 0% and recruitment of young plants increased to 14%. Cover is still less than 1%

Grass:

- **1985 to 1991 – slightly up (+1):** The sum of nested frequency of perennial grasses increased 26%. Crested and intermediate wheatgrass dominate the grass community.
- **1991 to 1999 - stable (0):** The sum of nested frequency of perennial grasses is similar to the last sampling. Perennial grasses provide 12% cover. Crested and intermediate wheatgrass provide 83% of grass cover.

- **1999 to 2004 – slightly down (-1):** The sum of nested frequency of perennial grasses decreased by 21%, but cover has increased to 20%. Crested and intermediate wheatgrass account for 90% of grass cover.
- **2004 to 2009 – slightly up (+1):** The sum of nested frequency of perennial grasses increased 18% and cover increased to 25%. Crested and intermediate wheatgrass provided 89% of grass cover. Russian wildrye is increasing in cover.

Forb:

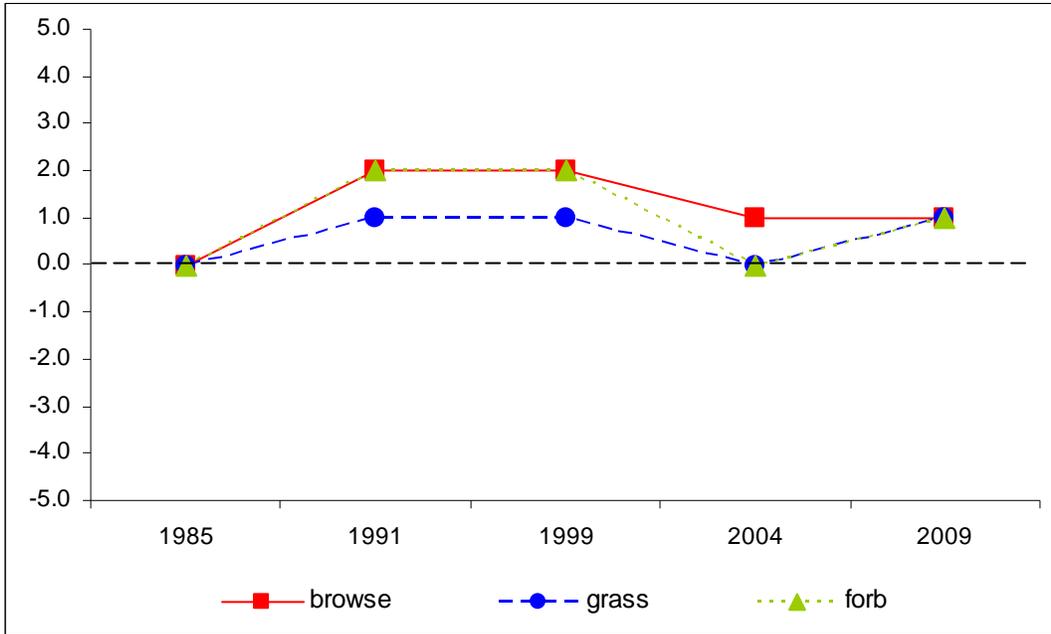
- **1985 to 1991 - up (+2):** The sum of nested frequency of perennial forbs increased 65%. Alfalfa (*Medicago sativa*) was the most frequent species.
- **1991 to 1999 - stable (0):** The sum of nested frequency of perennial forbs is similar to the last reading. Annual forbs are very common due to pale alyssum. Perennial forb cover is just under 4%.
- **1999 to 2004 - down (-2):** The sum of nested frequency of perennial forbs decreased 80% while annual forbs have continued to increase. Annual forb cover is now 3.5%, due to bur buttercup (*Ranunculus testiculatus*) while perennial forb cover is below 1%.
- **2004 to 2009 - slightly up (+1):** The sum of nested frequency of perennial forbs increased 38% while annual forbs are similar to the last sampling. Annual forb cover has increased to 6% due to a combination of pale alyssum and bur buttercup. Perennial forb cover increased, but is still low at 1%.

DEER DESIRABLE COMPONENTS INDEX - MID-LEVEL POTENTIAL SCALE --
Management unit 25A, study no: 1

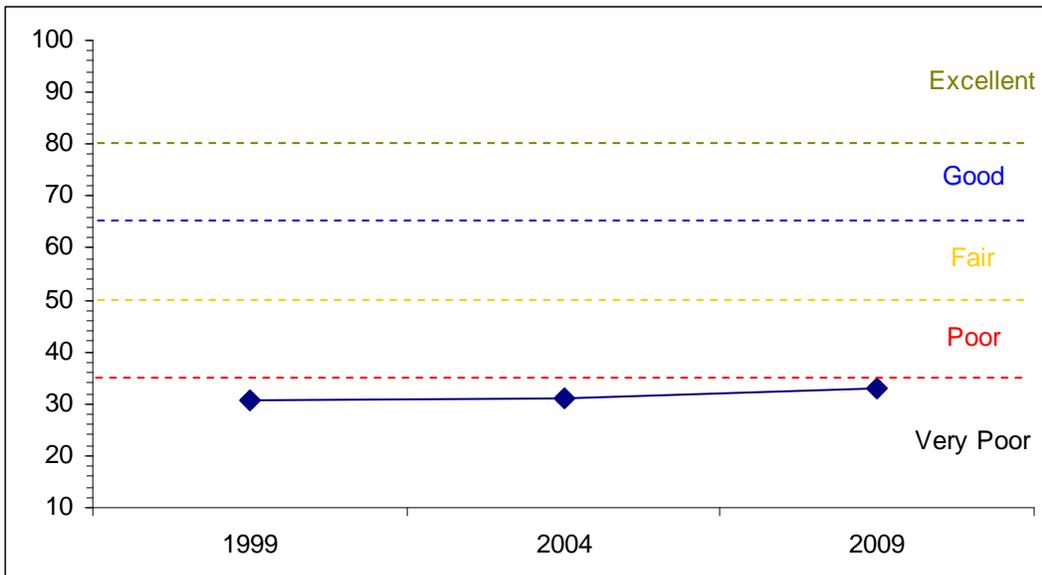
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
99	0.0	0.0	0.0	23.2	0.0	7.3	0.0	30.5	Very Poor
04	0.2	0.0	0.0	30.0	-0.1	1.1	0.0	31.2	Very Poor
09	0.9	0.0	0.0	30.0	0.0	2.0	0.0	32.8	Very Poor

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 25A Study no: 1



DEER DESIRABLE COMPONENTS INDEX TREND, MID-LEVEL POTENTIAL
 Management unit 25A, Study no: 1



HERBACEOUS TRENDS--
Management unit 25A, Study no: 1

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
G	Agropyron cristatum	b ₂₆₇	b ₂₉₃	b ₂₄₂	a ₂₀₈	b ₂₅₅	7.19	13.39	15.72
G	Agropyron intermedium	a ₁₀₉	a ₁₅₈	b ₁₈₀	b ₁₆₃	b ₁₈₄	2.45	4.88	6.44
G	Agropyron smithii	a ₁	b ₁₈	a ⁻	a ⁻	a ⁻	-	-	-
G	Agropyron spicatum	7	7	2	-	12	.00	-	.12
G	Bromus tectorum (a)	-	-	6	19	15	.02	.11	.05
G	Elymus junceus	bc ₇₉	c ₉₉	bc ₉₅	a ₂₄	ab ₅₈	1.76	.59	2.58
G	Elymus salina	a ⁻	a ⁻	a ⁻	b ₁₈	a ₁	-	.99	.15
G	Festuca ovina	b ₉	c ₂₅	a ⁻	a ⁻	a ⁻	-	-	-
G	Oryzopsis hymenoides	-	-	1	2	-	.00	.06	-
G	Poa secunda	a ⁻	a ⁻	c ₂₉	b ₁₉	a ⁻	.20	.13	-
G	Sitanion hystrix	3	-	-	-	-	-	-	-
Total for Annual Grasses		0	0	6	19	15	0.01	0.10	0.05
Total for Perennial Grasses		475	600	549	434	510	11.62	20.05	25.03
Total for Grasses		475	600	555	453	525	11.64	20.16	25.08
F	Alyssum alyssoides (a)	-	-	b ₂₆₀	a ₂₀₅	b ₂₈₁	1.41	1.14	4.06
F	Antennaria rosea	b ₁₈	a ⁻	ab ₇	a ₂	a ₂	.04	.01	.03
F	Aster sp.	5	-	1	-	-	.00	-	-
F	Astragalus sp.	a ₁	ab ₁₁	ab ₆	ab ₂	b ₁₃	.21	.00	.20
F	Chaenactis douglasii	-	2	-	-	-	-	-	-
F	Cryptantha sp.	a ⁻	ab ₁₉	b ₅₂	a ₁	a ⁻	.92	.00	-
F	Descurainia pinnata (a)	-	-	-	4	-	-	.02	-
F	Gilia sp. (a)	-	-	-	-	-	-	.00	-
F	Hymenoxys acaulis	-	8	-	-	-	-	-	-
F	Linum lewisii	-	-	-	-	4	-	-	.01
F	Lithospermum ruderales	1	1	3	-	-	.03	-	-
F	Medicago sativa	b ₇₄	b ₁₁₀	b ₉₉	a ₂₄	a ₂₃	2.43	.47	.67
F	Penstemon sp.	-	-	-	-	3	-	-	.03
F	Phlox austromontana	ab ₄	b ₁₃	a ₁	ab ₂	a ₂	.00	.01	.03
F	Ranunculus testiculatus (a)	-	-	a ₃	c ₁₉₂	b ₁₁₇	.00	2.35	1.97
F	Streptanthus cordatus	-	-	-	3	-	-	.03	-
F	Townsendia sp.	-	6	-	-	-	-	-	-
Total for Annual Forbs		0	0	263	401	398	1.41	3.53	6.03
Total for Perennial Forbs		103	170	169	34	47	3.65	0.53	0.98
Total for Forbs		103	170	432	435	445	5.07	4.06	7.02

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

BROWSE TRENDS--

Management unit 25A, Study no: 1

Type	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	Artemisia nova	15	14	15	.01	.18	.71
B	Chrysothamnus nauseosus	2	0	1	.00	-	.03
B	Chrysothamnus viscidiflorus	2	2	1	.00	.15	.00
B	Gutierrezia sarothrae	1	4	8	.00	.00	.30
B	Juniperus osteosperma	0	1	2	-	1.18	1.00
B	Leptodactylon pungens	2	2	0	.00	.00	-
B	Pinus edulis	3	0	0	.48	-	-
Total for Browse		25	23	27	0.49	1.51	2.04

CANOPY COVER, LINE INTERCEPT--

Management unit 25A, Study no: 1

Species	Percent Cover		
	'99	'04	'09
Artemisia nova	-	.88	.76
Chrysothamnus viscidiflorus	-	.03	-
Gutierrezia sarothrae	-	.48	.50
Juniperus osteosperma	-	1.39	1.28
Pinus edulis	3.00	-	-

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 25A, Study no: 1

Species	Average leader growth (in)	
	'04	'09
Artemisia nova	2.0	1.3

POINT-QUARTER TREE DATA--

Management unit 25A, Study no: 1

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus osteosperma	35	34	24	5.3	4.8	4.1
Pinus edulis	43	33	20	4.0	5.6	4.7

BASIC COVER--

Management unit 25A, Study no: 1

Cover Type	Average Cover %				
	'85	'91	'99	'04	'09
Vegetation	10.50	12.50	19.34	26.27	35.95
Rock	4.50	4.75	4.50	6.74	4.11
Pavement	19.50	13.50	10.88	23.19	6.56
Litter	30.75	48.00	26.33	31.02	41.54
Cryptogams	0	.50	1.20	2.27	.39
Bare Ground	34.75	20.75	18.20	18.53	33.67

SOIL ANALYSIS DATA --

Management unit 25A, Study no: 1, Study Name: Triangle Mountain

Effective rooting depth (in)	pH	loam			%0M	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11.7	7.6	40	34.7	25.3	5.8	6.5	243.2	0.7

PELLET GROUP DATA--

Management unit 25A, Study no: 1

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'04	'09	'99	'04	'09
Rabbit	27	44	11	-	-	-
Elk	18	12	34	66 (162)	12 (30)	51 (127)
Deer	18	16	17	21 (53)	10 (25)	4 (10)
Cattle	10	12	8	49 (120)	5 (13)	38 (93)

BROWSE CHARACTERISTICS--

Management unit 25A, Study no: 1

		Age class distribution						Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)		
Artemisia nova											
85	66	0	100	0	-	0	0	0	12/20		
91	199	67	33	0	-	33	0	0	19/36		
99	480	38	63	0	40	29	0	0	15/23		
04	420	0	81	19	-	19	0	5	11/18		
09	420	14	86	0	-	5	0	5	12/24		
Chrysothamnus nauseosus											
85	66	0	100	0	-	0	0	0	14/9		
91	399	83	0	17	-	17	0	17	-/-		
99	40	50	50	0	-	0	0	0	18/16		
04	0	0	0	0	-	0	0	0	17/19		
09	20	0	100	0	-	0	0	0	24/31		
Chrysothamnus nauseosus hololeucus											
85	0	0	0	-	-	0	0	0	-/-		
91	0	0	0	-	-	0	0	0	-/-		
99	0	0	0	-	-	0	0	0	-/-		
04	0	0	0	-	-	0	0	0	26/40		
09	0	0	0	-	-	0	0	0	-/-		
Chrysothamnus viscidiflorus											
85	0	0	0	-	-	0	0	0	-/-		
91	0	0	0	-	-	0	0	0	-/-		
99	40	0	100	-	-	0	0	0	8/8		
04	60	0	100	-	-	0	0	0	6/7		
09	40	0	100	-	-	100	0	0	8/7		

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Gutierrezia sarothrae</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	20	0	100	-	-	0	0	0	9/7	
04	120	0	100	-	-	0	0	0	10/14	
09	460	4	96	-	-	0	0	0	8/12	
<i>Juniperus osteosperma</i>										
85	0	0	0	0	-	0	0	0	-/-	
91	0	0	0	0	-	0	0	0	-/-	
99	0	0	0	0	-	0	0	0	-/-	
04	20	0	100	0	-	0	0	0	-/-	
09	40	0	0	100	-	0	0	100	-/-	
<i>Leptodactylon pungens</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	60	0	100	-	-	0	0	0	4/13	
04	40	0	100	-	-	0	0	0	5/10	
09	0	0	0	-	-	0	0	0	-/-	
<i>Pinus edulis</i>										
85	66	0	100	-	-	0	0	0	51/31	
91	66	0	100	-	-	0	0	0	72/75	
99	60	0	100	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	-/-	