

Trend Study 18B-34-07

Study site name: Three O'Clock.

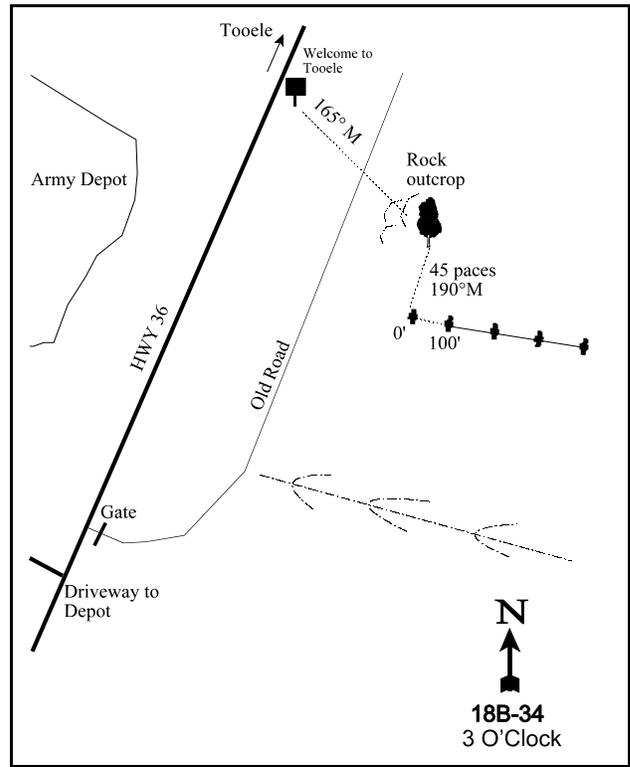
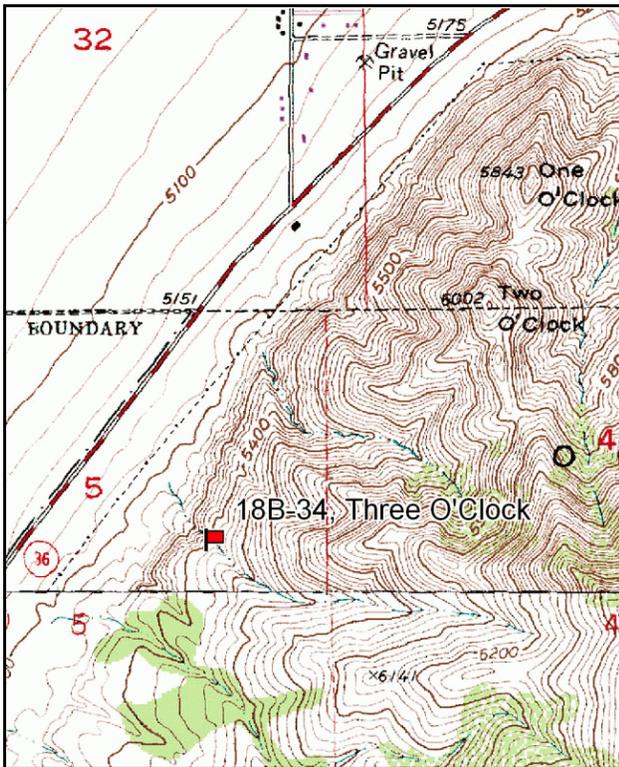
Vegetation type: Mountain Big Sagebrush.

Compass bearing: frequency belt ~120 degrees magnetic.

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

LOCATION DESCRIPTION

Park at the "Welcome to Tooele" sign south of Tooele. From the sign walk at 165 degrees magnetic to a rock outcrop with a lone juniper. From the lone juniper, go 45 paces at 190 degrees magnetic to a rock cairn or the 0-foot stake.



Map name: Tooele

Diagrammatic Sketch

Township 3S, Range 4W, Section 33

GPS: NAD 83, UTM 12T 388377 E 4484202 N

DISCUSSION

Three O'Clock - Trend Study No. 18B-34

Study Information

This study was established to monitor deer and elk winter range east of highway 36 between Tooele and Stockton [elevation: 5,400 feet (1,646 m), slope: 20%, aspect: west]. This mountain big sagebrush study is located on the Bonneville lake terrace. The whole area burned in the late 1980's, but now has a healthy stand of mountain big sagebrush. The vicinity is used heavily by deer and elk primarily in the winter and early spring. Deer pellet group transect data estimates were 30 days use/acre in 2002 and 38 in 2007 (74 ddu/ha in 2002 and 94 in 2007). Some of the deer pellet groups may be from antelope which also use the area. Elk pellet group estimates were 43 days use/acre in 2002 and 53 in 2007 (106 edu/ha in 2002 and 131 in 2007). Cattle estimates were 13 days use/acre in 2002 (32 cdu/ha). Horse use was estimated at 3 days use/acre (7 hdu/ha) in 2007.

Soil

The soil is in the Broad-Reywat outcrop association, which consists of shallow to moderately deep, well drained, moderately to slowly permeable soils that formed in residuum and colluvium from quartzite, sandstone, andesite, or basalt parent materials on hills, plateaus, and mountainsides (USDA-NRCS 2007). The soil is shallow and very rocky on the surface and within the profile. The texture is a sandy clay loam with a slightly acidic reaction (pH of 6.4). There is little exposed bare ground on the site primarily due to the abundance of bulbous bluegrass (*Poa bulbosa*). Relative bare ground cover was only 6% in 2002 and 5% in 2007. The erosion condition class was determined as stable in 2002 and 2007.

Browse

The key browse species is mature mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). The density was 6,480 plants/acre (16,006 plants/ha) in 2002 and 4,620 (11,411/ha) in 2007. The majority of sagebrush individuals are in the mature age classification. Decadence increased from 7% of the population in 2002 to 24% in 2007. This population of mountain big sagebrush is low growing, averaging only 16 inches in height. The individuals displayed moderate-heavy use and good vigor both years. Average annual leader growth estimates were 1.4 inches (3.6 cm) in 2002 and 2007. The only other common shrub sampled was broom snakeweed (*Gutierrezia sarothrae*) which had a density of 3,320 plants/acre (8,200 plants/ha) in 2002 and 1,980 plants/acre (4,891 plants/ha) in 2007. There were scattered, very heavily hedged antelope bitterbrush (*Purshia tridentata*) and serviceberry (*Amalanchier utahensis*) on the study, but none were sampled.

Herbaceous Understory

The herbaceous understory is diverse and provides high cover. The low forage and ecological value bulbous bluegrass is the dominant species; it provided 36% cover in 2002 and 19% in 2007. Bulbous bluegrass provides little forage and dries out completely by early summer. The only other common grasses include purple threeawn (*Aristida purpurea*) and cheatgrass (*Bromus tectorum*). Cheatgrass provided 1% cover in 2002 and 2007. Sandberg bluegrass also provided a substantial amount of cover in 2007 (7%).

Forbs are diverse with 22 species sampled in 2002 and 24 species in 2007. The most abundant species sampled were silky milkvetch (*Astragalus cibarius*), draba (*Draba* sp.), and holosteum (*Holosteum umbellatum*). Bur buttercup (*Ranunculus testiculatus*) was sampled for the first time in 2007.

2007 TREND ASSESSMENT

The browse trend is down. The density of sagebrush, the key browse species, decreased 29% from 6,480 plants/acre (16,006 plants/ha) to 4,620 (11,411/ha), but sagebrush cover increased from 14% to 17%. It is quite possible that population is thinning itself as it matures. Plants classified as decadent increased from 7% of the population to 24% and those classified as dying increased from 2% of the population to 12%. Five

percent of the plants sampled were infested with insects. The grass trend is up. The sum of the nested frequency of perennial grasses, excluding bulbous bluegrass, increased nearly three-fold and the nested frequency of cheatgrass decreased significantly. The forb trend is up. The sum of the nested frequency of perennial forbs increased 25%. Several species are utilized by big game. The Desirable Components Index (DCI) score in 2002 was poor due to a low percentage of young individuals and low perennial grass cover (excluding bulbous bluegrass). The 2007 DCI score increased to good-fair due to an increase in preferred browse and perennial grass cover.

2002 winter range condition (DCI) - poor (46) Mid-level potential scale
2007 winter range condition (DCI) - good-fair (66) Mid-level potential scale
browse - down (-2) grass - up (+2) forb - up (+2)

HERBACEOUS TRENDS --
Management unit 18B, Study no: 34

Type	Species	Nested Frequency		Average Cover %	
		'02	'07	'02	'07
G	Agropyron spicatum	4	-	.01	-
G	Aristida purpurea	_a 94	_a 91	1.69	2.79
G	Bromus tectorum (a)	_b 227	_a 98	.95	.93
G	Festuca myuros (a)	-	2	-	.00
G	Poa bulbosa	_b 470	_a 363	35.82	19.31
G	Poa secunda	_a 29	_b 264	.14	7.40
G	Sitanion hystrix	_a 3	_a 2	.18	.15
G	Sporobolus cryptandrus	_a 5	_a 8	.07	.71
G	Vulpia octoflora (a)	_a 1	_b 15	.00	.05
Total for Annual Grasses		228	115	0.96	0.99
Total for Perennial Grasses		605	728	37.91	30.37
Total for Grasses		833	843	38.87	31.36
F	Alyssum alyssoides (a)	_a 15	_a 22	.02	.05
F	Antennaria rosea	_a 2	_a 6	.03	.04
F	Astragalus cibarius	_a 53	_a 58	1.23	1.18
F	Asclepias sp.	_a 1	_a 2	.15	.38
F	Astragalus utahensis	_a 5	_a 4	.09	.08
F	Castilleja linariaefolia	_a 7	_a 15	.41	.32
F	Calochortus nuttallii	_a 17	_a 29	.06	.14
F	Cirsium sp.	_a 22	_b 33	.50	.88
F	Crepis acuminata	_a 21	_a 27	.18	.20
F	Draba sp. (a)	-	198	-	.65
F	Epilobium brachycarpum (a)	_a 3	_a 3	.00	.00
F	Erodium cicutarium (a)	_a 25	_a 23	.13	.31
F	Eriogonum racemosum	_a 40	_a 47	.21	.59

T y p e	Species	Nested Frequency		Average Cover %	
		'02	'07	'02	'07
F	Gilia sp. (a)	1	-	.00	-
F	Helianthus annuus (a)	_b 137	_a 2	.33	.01
F	Heterotheca villosa	_a 7	_a 9	.31	.35
F	Holosteum umbellatum (a)	_a 1	_b 139	.00	.32
F	Lomatium sp.	-	1	-	.00
F	Petradoria pumila	2	-	.00	-
F	Phlox hoodii	_a 3	_a 3	.03	.03
F	Phlox longifolia	_a 24	_a 17	.08	.12
F	Polygonum douglasii (a)	_a 10	_a 17	.02	.06
F	Ranunculus testiculatus (a)	-	10	-	.02
F	Sphaeralcea coccinea	-	2	-	.00
F	Tragopogon dubius	_a 21	_a 24	.12	.13
F	Zigadenus paniculatus	_a 22	_b 31	.39	.50
Total for Annual Forbs		192	414	0.53	1.43
Total for Perennial Forbs		247	308	3.81	4.97
Total for Forbs		439	722	4.34	6.41

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

BROWSE TRENDS --

Management unit 18B, Study no: 34

T y p e	Species	Strip Frequency		Average Cover %	
		'02	'07	'02	'07
B	Artemisia tridentata vaseyana	84	74	14.41	16.96
B	Chrysothamnus nauseosus albicaulis	3	4	.06	.00
B	Gutierrezia sarothrae	66	47	.86	.79
B	Opuntia sp.	3	4	.00	.03
B	Sarcobatus vermiculatus	0	1	-	-
B	Tetradymia canescens	5	6	.03	.53
Total for Browse		161	136	15.37	18.32

CANOPY COVER, LINE INTERCEPT --

Management unit 18B, Study no: 34

Species	Percent Cover	
	'02	'07
Artemisia tridentata vaseyana	-	18.10
Chrysothamnus nauseosus albicaulis	-	.20
Gutierrezia sarothrae	-	.30
Tetradymia canescens	-	4.21

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 18B, Study no: 34

Species	Average leader growth (in)	
	'02	'07
Artemisia tridentata vaseyana	1.4	1.4

BASIC COVER --

Management unit 18B, Study no: 34

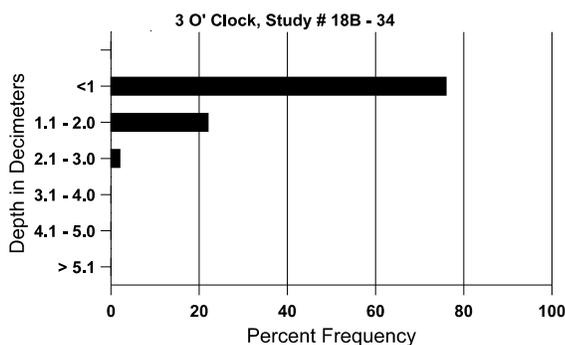
Cover Type	Average Cover %	
	'02	'07
Vegetation	61.09	52.68
Rock	13.46	9.88
Pavement	9.80	8.60
Litter	24.87	19.83
Cryptogams	3.27	10.18
Bare Ground	6.83	5.73

SOIL ANALYSIS DATA --

Herd Unit 18B, Study no: 34, Three O'Clock

Effective rooting depth (in)	Temp °F (depth)	pH	Sandy clay loam			%OM	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
8.9	-	6.4	46.9	24.4	28.7	2.7	20.7	518.4	.8

Stoniness Index



PELLET GROUP DATA --
 Management unit 18B, Study no: 34

Type	Quadrat Frequency		Days use per acre (ha)	
	'02	'07	'02	'07
Rabbit	-	2	-	-
Horse	-	3	-	3 (7)
Elk	27	23	43 (116)	53 (131)
Deer	24	21	30 (74)	38 (94)
Cattle	2	1	13 (32)	-

BROWSE CHARACTERISTICS --
 Management unit 18B, Study no: 34

		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)
Amelanchier utahensis												
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	33/44
Artemisia tridentata vaseyana												
02	6480	20	80	5940	460	520	40	39	7	2	2	15/24
07	4620	460	80	3420	1120	240	36	33	24	12	16	17/32
Chrysothamnus nauseosus albicaulis												
02	60	-	-	60	-	-	33	33	0	-	0	10/9
07	80	-	20	20	40	-	50	25	50	25	25	20/37
Chrysothamnus viscidiflorus viscidiflorus												
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	18/24
Gutierrezia sarothrae												
02	3320	40	100	2920	300	320	0	0	9	3	3	6/7
07	1980	20	240	1500	240	140	0	0	12	6	6	7/9
Opuntia sp.												
02	60	-	20	40	-	-	0	0	-	-	0	5/12
07	80	-	20	60	-	-	0	0	-	-	0	5/12
Purshia tridentata												
02	0	20	-	-	-	20	0	0	-	-	0	22/57
07	0	-	-	-	-	-	0	0	-	-	0	39/74
Rhus trilobata												
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	20	-	-	-	-	0	0	-	-	0	32/50

		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>Sarcobatus vermiculatus</i>													
02	0	-	-	-	-	-	0	0	-	-	0	-/-	
07	200	-	-	200	-	-	0	100	-	-	0	-/-	
<i>Tetradymia canescens</i>													
02	100	-	-	100	-	60	20	0	0	-	0	15/22	
07	120	-	20	80	20	-	17	0	17	-	0	12/29	