

Trend Study 17-26-07

Study site name: Orem Water Tank .

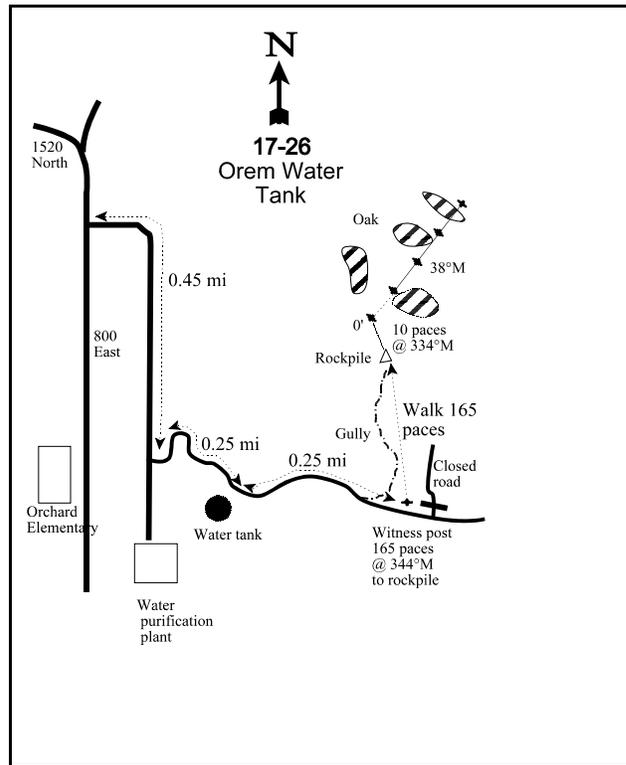
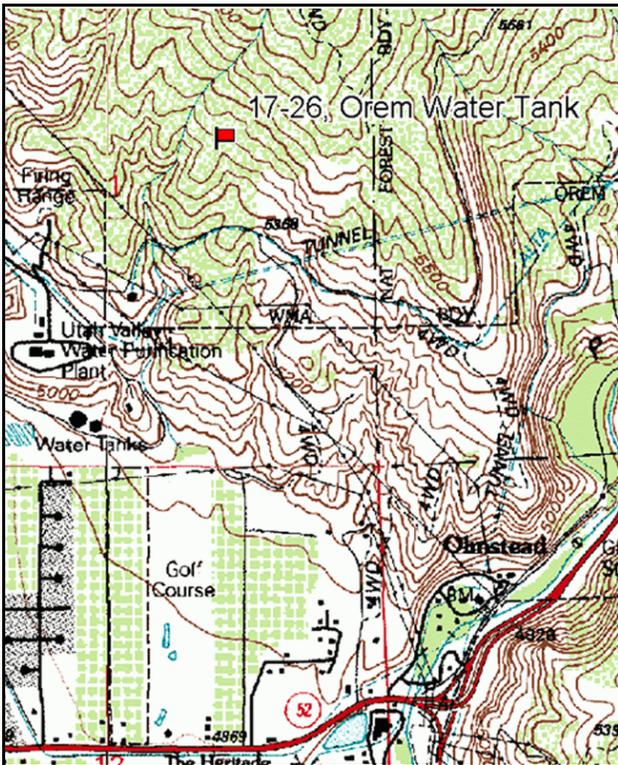
Vegetation type: Oak/Seeding .

Compass bearing: frequency baseline 38 degrees magnetic.

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

LOCATION DESCRIPTION

You will need a key from Orem City to access this site. On the north side of Orem, go east up 1600 North (which turns into 1520 North) to 800 East. Just south of this intersection on 800 East, turn up the road towards the water purification plant. Go 0.45 miles, turn left and go 0.25 miles to a water tank. Continue on this road 0.25 miles and park. The old road towards the study site is closed, but a witness post should mark the junction. From there, walk about 165 paces (275 yards) to a rock pile at the head of a small drainage or gully. From the rockpile, walk north 10 paces at 334 degrees magnetic to the 0-foot baseline stake at the edge of the oakbrush. It is marked by a red browse tag #3913.



Map Name: Orem

Diagrammatic Sketch

Township 6S, Range 2E, Section 1

GPS: NAD 83, UTM 12T 443622 E 4464321 N

DISCUSSION

Orem Water Tank - Trend Study No. 17-26

Study Information

This study was established in 1983 on a burned and seeded oakbrush community immediately north of the Orem Water Treatment Plant [elevation: 5,500 feet (1,676 m), slope: 8% at base and 30% near top, aspect: south]. The nearest source of perennial water is found in the residential area 0.5 miles (0.8 km) to the southwest. In the summer of 1996, a fire burned through the area again, and consumed what browse had come back from the previous fire. Resprouting browse plants, such as Gambel oak (*Quercus gambelii*), are the exception. Deer use has been heavy in the past, but only light hedging has been noted since 1997. Deer pellet groups were frequent with some scattered elk pellet groups. Livestock are excluded to protect watershed quality. In 1983, grasshopper damage was apparent on the oak, but not enough to impact vigor. From the pellet group transect, there were 49 deer days use/acre (121 ddu/ha) in 2002 and 8 deer days use/acre (20 ddu/ha) in 2007. Elk use was estimated at 60 days use/acre (147 edu/ha) in 2002 and 88 days use/acre (217 edu/ha) in 2007. Most of the deer and elk use appeared to be from winter and spring in 2002, and winter and fall in 2007. Deer carcasses were found near the study in 2007.

Soil

This study is located within the Dry Creek soil series, which consists of very deep, well-drained, slowly permeable soils. This series formed in alluvium and colluvium from sedimentary rocks and are located on pre-Bonneville fans and lower mountainsides. The soil is classified as fine, smectitic, mesic Typic Palexerolls (USDA-NRCS 2007). Specifically at the study, the soil has a clay loam texture with a neutral soil reaction (pH of 6.7). Except in 1997, bare ground cover has been very low, and the ground is covered by an abundance of vegetation and litter. Bare ground cover was high in 1997 because of the 1996 wildfire. The erosion condition was classified as stable in 2002 and 2007.

Browse

Gambel oak has been the dominant browse species since the study was established. Oak canopy cover was 25% in 2002 and increased to 38% in 2007. The density decreased from 15,333 stems/acre (37,953 stems/ha) in 1983 to 10,560 stems/acre (26,140 stems/ha) in 1997, and increased to 19,340 stems/acre (47,870 stems/ha) by 2007. Seedling density increased from 1,400 seedlings/acre (3,465 seedlings/ha) in 1983 to 4,580 seedlings/acre (11,335 seedlings/ha) in 1997, and few seedlings have been sampled since. Of these seedlings, it is expected that the majority are the result of clonal sprouting. Recruitment has been moderate and high, young plants have comprised between 16% and 77% of the population. Decadence has been low at 0%-13%. Dead plants were first sampled in 1997 at a density of 8,280 plants/acre (20,495 plants/ha), and decreased to approximately 1,470 plants/acre (3,639 plants/ha). The proportion of plants exhibiting poor vigor has been low at 0%-7%. Browse use was moderate in 1983, and has been light in subsequent years.

Mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) had a low density of only 333 plants/acre (825 plants/ha) in 1989. All sagebrush plants were consumed by the 1996 fire, and none have been sampled since. Fourwing saltbush (*Atriplex canescens*) was seeded, but not sampled in the density strips in any reading.

Herbaceous Understory

Collectively, perennial and annual grasses have comprised an average 31% cover since 1997; perennial grass cover has averaged 21%. Smooth brome (*Bromus inermis*) is the dominant perennial grass in the oak understory, while intermediate wheatgrass (*Agropyron intermedium*) and crested wheatgrass (*Agropyron cristatum*) are dominant in the interspaces. Annual grass cover increased from 3% in 1997 to 16% by 2007. Cheatgrass (*Bromus tectorum*) is the dominant annual species and quadrat frequency has increased from 38% in 1997 to 70% in 2007. Bulbous bluegrass (*Poa bulbosa*), a perennial with a phenology that is similar to annual grasses (Stewart and Hull 1949), is present, but has comprised less than 1% cover.

Perennial forb cover was 13% in 1997, 8% in 2002, and 6% in 2007. Alfalfa (*Medicago sativa*) has been the dominant species, and has been healthy and robust despite animal use. Other perennial forbs were seldom sampled. Dalmatian toadflax (*Linaria dalmatica*), a noxious weed, has been sampled in a small, but increasing number of quadrats since 1997.

1989 TREND ASSESSMENT

The browse trend is slightly down. The density of Gambel oak decreased 7%. There were large increases in the densities of seedlings and young plants, but there was also a large decrease in the density of mature plants. Decadence increased from 1% to 13% of the population, and plants with poor vigor increased from 0% to 7%. Browse use on oak shifted from moderate to light. In addition to the changes in the oak population, the sagebrush population was in decline. The density decreased 17%, and all of the sampled plants were classified as decadent. Plants with poor vigor comprised 60% of the sagebrush population. Browse use shifted from exclusively heavy to moderate-heavy. The grass trend is stable. The sum of nested frequency of perennial grasses increased 6%, including a significant increase in smooth brome. The forb trend is slightly down. The sum of nested frequency of perennial forbs decreased 48%, but perennial forb frequency was already low. There was a significant decrease in the nested frequency of segolily (*Calochortus nuttallii*), and northern sweetvetch (*Hedysarum boreale*) was not sampled.

browse - slightly down (-1)

grass - stable (0)

forb - slightly down (-1)

1997 TREND ASSESSMENT

The browse trend is slightly down. The 1996 fire consumed all of the browse species. Even though Gambel oak resprouted, the sagebrush population appeared to be lost. The density of oak decreased 26%, but the resprouting plants were predominantly vigorous. Young plants comprised 77% of the population, and there were no decadent plants. As a result of the wildfire, the density of dead oak plants increased from 0 to 8,280 plants/acre (20,495 plants/ha). Browse use remained light. The grass trend is slightly down. The sum of nested frequency of perennial grasses decreased 13%. Most of the decrease was attributed to intermediate wheatgrass and smooth brome. However, there was a significant increase in crested wheatgrass. The forb trend is up. The sum of nested frequency of perennial forbs increased more than three-fold. There were significant increases in segolily and alfalfa. Dalmatian toadflax was sampled for the first time, but was only found in one quadrat. The Desirable Components Index (DCI) score was good due to the moderate browse cover, low browse decadence, high browse recruitment, and high perennial grass and forb cover.

winter range condition (DCI) - good (73) Mid-level potential scale

browse - slightly down (-1)

grass - slightly down (-1)

forb - up (+2)

2002 TREND ASSESSMENT

The browse trend is up. The density of oak increased 78%, and cover increased from 8% to 17%. The age class distribution shifted towards a mature stand. No seedling plants were sampled, and the young age class decreased to 16% of the population. Decadence remained stable at 0%, and the density of dead plants decreased to 1,320 plants/acre (3,267 plants/ha). Plants with poor vigor comprised less than 1% of the population. The average crown height increased from 13 inches (33 cm) to 31 inches (79 cm). Browse use on oak remained light. The grass trend is stable. Excluding bulbous bluegrass, the sum of nested frequency decreased 4%. In addition to bulbous bluegrass being sampled for the first time, there were significant increases in the nested frequencies of cheatgrass and Japanese brome (*Bromus japonicus*). Additionally, cheatgrass cover increased from 2% to 9%, and quadrat frequency increased from 38% to 51%. The forb trend is stable. Excluding dalmatian toadflax, the sum of nested frequency of perennial forbs increased 6%. There was a significant decrease in segolily, and a significant increase in alfalfa. Although alfalfa frequency increased, cover decreased from 12% to 8%. The DCI score remained good.

winter range condition (DCI) - good (70) Mid-level potential scale
browse - up (0) grass - stable (0) forb - stable (0)

2007 TREND ASSESSMENT

The browse trend is stable. The density of oak increased 3%, and cover increased from 17% to 23%. Young plants increased to 23% of the population. Decadence remained very low; increasing from 0% to 1%. Vigor also remained good, and browse use remained light. The grass trend is stable. Excluding bulbous bluegrass, the sum of nested frequency of perennial grasses decreased 6%. There was a significant increase in the nested frequencies of cheatgrass and bulbous bluegrass. Cheatgrass cover increased from 9% to 16%, and it was sampled in 70% of the quadrats. Annual grass cover was approximately equal to perennial grass cover. The forb trend is slightly down. Excluding dalmatian toadflax, the sum of nested frequency of perennial forbs decreased 14%. There were significant increases in storksbill (*Erodium cicutarium*) and catchweed bedstraw (*Galium aparine*). The DCI score remained good.

winter range condition (DCI) - good (75) Mid-level potential scale
browse - stable (0) grass - stable (0) forb - slightly down (-1)

HERBACEOUS TRENDS --
Management unit 17 , Study no: 26

T y p e	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
G	Agropyron cristatum	a8	a1	b41	ab18	a17	1.68	.45	1.44
G	Agropyron intermedium	a173	a166	a103	a121	a111	4.96	6.98	4.75
G	Bromus inermis	a235	b268	ab232	ab224	a202	13.45	18.14	11.19
G	Bromus japonicus (a)	-	-	a37	b60	-	.86	1.03	-
G	Bromus tectorum (a)	-	-	a105	b161	c254	2.49	9.32	16.13
G	Poa bulbosa	-	-	-	a3	b18	-	.18	.19
G	Poa pratensis	-	a3	-	a1	-	-	.00	-
G	Poa secunda	a3	a7	a10	a6	a18	.06	.04	.22
G	Vulpia octoflora (a)	-	-	a2	a3	a12	.00	.00	.21
Total for Annual Grasses		0	0	144	224	266	3.36	10.36	16.34
Total for Perennial Grasses		419	445	386	373	366	20.17	25.80	17.82
Total for Grasses		419	445	530	597	632	23.54	36.16	34.16
F	Alyssum alyssoides (a)	-	-	b101	ab79	a55	.73	.46	.16
F	Astragalus sp.	-	2	-	-	-	-	-	-
F	Calochortus nuttallii	b20	a1	b14	a1	-	.04	.00	-
F	Collomia linearis (a)	-	-	-	1	-	-	.00	-
F	Comandra pallida	-	-	-	-	4	-	-	.03
F	Descurainia pinnata (a)	-	-	a10	a5	a10	.02	.01	.03
F	Draba sp. (a)	-	-	-	-	7	-	-	.01
F	Epipactis gigantea	-	-	2	-	-	.00	-	-
F	Erodium cicutarium (a)	-	-	ab28	a16	b34	.21	.51	1.17

Type	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
F	Eriogonum racemosum	a5	a3	a5	-	-	.03	-	-
F	Galium aparine (a)	-	-	a6	a4	b42	.04	.01	1.02
F	Hedysarum boreale	22	-	-	-	-	-	-	-
F	Holosteum umbellatum (a)	-	-	a2	b14	b18	.00	.04	.04
F	Lappula occidentalis (a)	-	-	7	-	-	.02	-	-
F	Lactuca serriola	-	-	2	-	-	.18	-	-
F	Linaria dalmatica	-	-	a3	a4	a13	.03	.01	.26
F	Medicago sativa	a14	a22	b99	c140	bc110	12.19	7.60	5.55
F	Phlox longifolia	-	-	-	-	1	-	-	.00
F	Polygonum douglasii (a)	-	-	2	-	-	.00	-	-
F	Sphaeralcea coccinea	a6	a8	a6	a-	a5	.04	.00	.03
F	Tragopogon dubius	a1	-	a5	-	-	.06	-	-
F	Zigadenus paniculatus	a1	-	-	-	a1	-	-	.03
Total for Annual Forbs		0	0	156	119	166	1.04	1.04	2.46
Total for Perennial Forbs		69	36	136	145	134	12.59	7.62	5.92
Total for Forbs		69	36	292	264	300	13.64	8.67	8.38

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

BROWSE TRENDS --

Management unit 17 , Study no: 26

Type	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	Chrysothamnus nauseosus albicaulis	1	0	0	-	-	-
B	Quercus gambelii	57	59	57	7.65	16.63	23.18
Total for Browse		58	59	57	7.65	16.63	23.18

CANOPY COVER, LINE INTERCEPT --

Management unit 17 , Study no: 26

Species	Percent Cover	
	'02	'07
Quercus gambelii	24.86	38.26

BASIC COVER --

Management unit 17 , Study no: 26

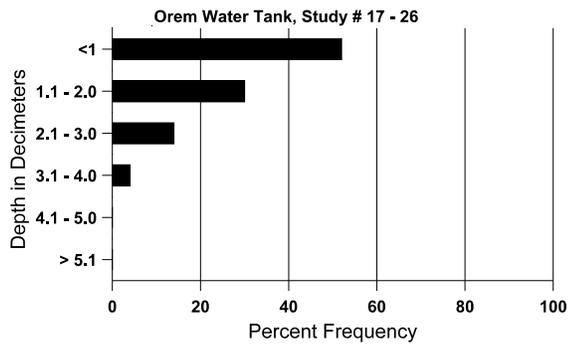
Cover Type	Average Cover %				
	'83	'89	'97	'02	'07
Vegetation	1.50	3.00	42.85	59.75	65.31
Rock	.50	1.00	3.87	.69	.87
Pavement	.75	1.00	1.99	.11	.05
Litter	95.50	91.50	34.48	72.68	60.89
Cryptogams	.25	0	.00	.00	.04
Bare Ground	1.50	3.50	23.51	1.08	.48

SOIL ANALYSIS DATA --

Herd Unit 17, Study no: 26, Orem Water Tank

Effective rooting depth (in)	Temp °F (depth)	pH	Clay loam			%OM	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
13.0	58.2 (14.3)	6.7	33.8	38.4	27.8	2.9	15.9	198.4	.7

Stoniness Index



PELLET GROUP DATA --

Management unit 17 , Study no: 26

Type	Quadrat Frequency		
	'97	'02	'07
Elk	7	15	14
Deer	36	11	5

Days use per acre (ha)	
'02	'07
60 (147)	88 (217)
49 (121)	8 (20)

BROWSE CHARACTERISTICS --
Management unit 17 , Study no: 26

		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	399	66	-	133	266	-	0	100	67	-	0	31/26
89	333	-	-	-	333	-	40	60	100	-	60	-/-
97	0	-	-	-	-	-	0	0	0	-	0	-/-
02	0	-	-	-	-	-	0	0	0	-	0	-/-
07	0	-	-	-	-	-	0	0	0	-	0	-/-
<i>Atriplex canescens</i>												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	16/13
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Chrysothamnus nauseosus albicaulis</i>												
83	0	-	-	-	-	-	0	0	-	-	0	-/-
89	0	-	-	-	-	-	0	0	-	-	0	-/-
97	20	-	20	-	-	-	0	100	-	-	0	-/-
02	0	-	-	-	-	-	0	0	-	-	0	-/-
07	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Gutierrezia sarothrae</i>												
83	133	-	-	-	133	-	0	0	100	-	0	-/-
89	0	-	-	-	-	-	0	0	0	-	0	-/-
97	0	-	-	-	-	-	0	0	0	-	0	-/-
02	0	-	-	-	-	-	0	0	0	-	0	-/-
07	0	-	-	-	-	-	0	0	0	-	0	11/17
<i>Quercus gambelii</i>												
83	15333	1400	4200	10933	200	-	92	1	1	-	0	40/15
89	14333	2666	9000	3533	1800	-	13	0	13	1	7	46/19
97	10560	4580	8160	2400	-	8280	0	0	0	-	2	13/10
02	18820	-	2940	15860	20	1320	6	0	0	.10	.10	31/16
07	19340	20	4460	14600	280	1620	6	0	1	.31	.31	40/21