Trend Study 17-61-07

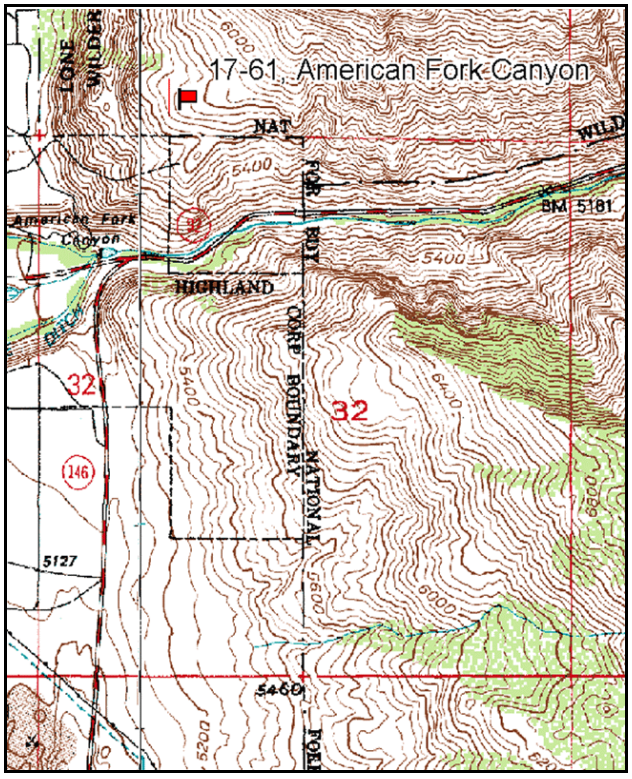
Study site name: American Fork Canyon . Vegetation type: P-J and Big Sagebrush .

Compass bearing: frequency baseline 330 degrees magnetic.

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

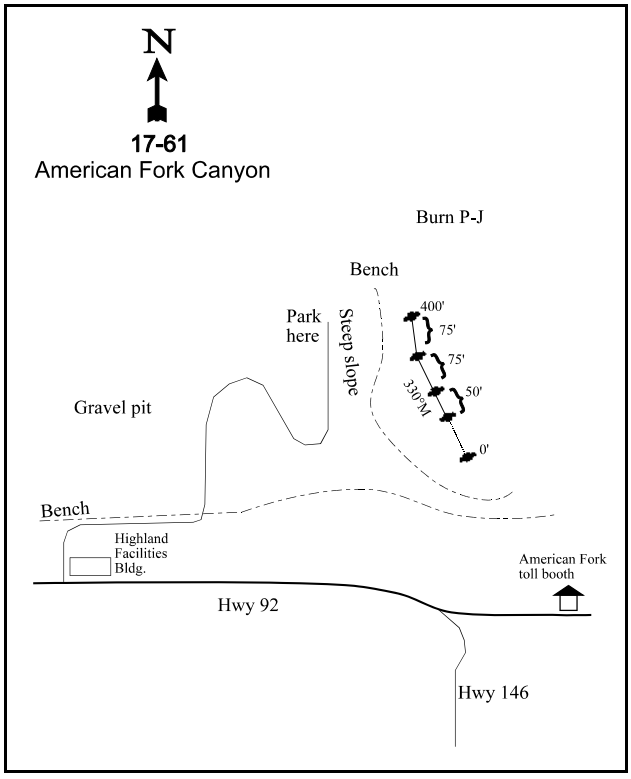
LOCATION DESCRIPTION

Go to American Fork Canyon on Highway 92. Toward the mouth of the canyon, there is a gravel pit on the north side of the road along with Highland Facilities building. Turn left on the road going north just before the buildings. Continue up this road until a steep slope is encountered. The site lies on the first bench of this slope. Park here. Walk east up the steep slope about 1/4 of a mile to another bench that has been burned. The site is just south of the burn. GPS coordinates will be helpful on this site. Development is currently under construction and this route may not be available in the future.



Map Name: Lehi

Township 4S , Range 2E , Section 29



Diagrammatic Sketch

GPS: NAD 83, UTM 12T 436451 E 4476462 N

DISCUSSION

American Fork Canyon - Trend Study No. 17-61

Study Information

This winter range study was established at the mouth of American Fork Canyon and within the boundary of the Lone Peak Wilderness area to monitor Rocky Mountain bighorn sheep use [elevation: 5,700 feet (1,737 m), slope: 25%, aspect: west]. The bighorn sheep were transplanted to the area towards the end of 1999, but the study was not established until 2002. The nearest perennial source of water is American Fork 0.25 miles (0.4 km) to the south. In addition to bighorn sheep, the area has also been used by deer and elk. From the pellet group transect data, deer use was estimated at 29 days use/acre (73 ddu/ha) in 2002 and 23 days use/acre (56 ddu/ha) in 2007. Elk use was estimated at 17 days use/acre (43 edu/ha) in 2002 and 7 days use/acre (17 edu/ha) in 2007. Bighorn sheep use was estimated at 56 days use/acre (137 sdu/ha) in 2002 and 33 days use/acre (81 sdu/ha) in 2007. There was some difficulty distinguishing between deer and bighorn sheep pellets in 2002 and 2007. Most of the big game pellet groups appear to be from winter use. The hillslope below the study area, and abutting the wilderness boundary, was being developed when the study was sampled in 2007. The area immediately north of the study was burned in a wildfire in the late 1990s.

Soil

The soil is shallow and extremely rocky. The parent material is limestone, which is exposed in large bed rock outcrops. The soil has a loam texture and is slightly alkaline (pH of 7.4). Relative bare ground cover has been quite low at 4% in 2002 and 1% in 2007, while the relative rock cover has been high at 18% in 2002 and 15% in 2007. Due to the low bare ground cover and high rock, vegetation, and litter cover, the erosion condition was classified as stable in 2002 and 2007.

Browse

The overstory is dominated by Utah juniper (*Juniperus osteosperma*) with an understory of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), true mountain mahogany (*Cercocarpus montanus*), and Stansbury cliffrose (*Cowania mexicana* ssp. *stansburiana*). Juniper canopy cover was 15% in 2002, and 16% in 2007. Based on point-quarter density estimates, there were 41 trees/acre (101 trees/ha) in 2002 and 39 trees/acre (97 trees/ha) in 2007. The average diameter increased from 9.1 inches (23.1 cm) in 2002 to 12.5 inches (31.8 cm) in 2007. Several of the trees sampled were highlined.

The canopy cover of sagebrush increased from 4% in 2002 to 7% in 2007. The density has ranged from 1,500 plants/acre (3,713 plants/ha) in 2002 to 1,000 plants/acre (2,475 plants/ha) in 2007, and the population is mostly mature. Seedling plants were sampled in 2007 at a density of 80 plants/acre (198 plants/ha). Few young plants have been sampled, and young plants have comprised 3% of the population or less. Decadence decreased from 25% of the population in 2002 to 12% in 2007, but the density of dead plants increased from 540 plants/acre (1,337 plants/ha) to 640 plants/acre (1,584 plants/ha). Plants classified as dying accounted for 17% of the population in 2002, and decreased to 4% by 2007. The average annual leader growth was 3.1 inches (7.9 cm) in 2002 and 1.4 inches (3.4 cm) in 2007. Browse use shifted from light-moderate in 2002 to moderate-heavy in 2007.

Cliffrose canopy cover decreased from 3% in 2002 to 1% in 2007. The small population has had a stable density of 120 plants/acre (297 plants/ha). The majority of the population consists of decadent plants: 67% in 2002 and 83% in 2007. Plants with poor vigor have comprised 17% of the population since 2002, and all of those plants were classified as dying. The average annual leader growth was 3.8 inches (9.7 cm) in 2002 and 1.9 inches (4.8 cm) in 2007. Browse use on cliffrose has been moderate-heavy. Less palatable shrubs sampled include a few white rubber rabbitbrush (*Chrysothamnus nauseosus* ssp. *albicaulis*), broom snakeweed (*Gutierrezia sarothrae*), and pricklypear cactus (*Opuntia* sp.). The collective canopy cover of these species has been less than 1%.

Herbaceous Understory

The herbaceous understory has low species diversity and is dominated by annual species. Annual grass cover was 41% in 2002 and 38% in 2007. Cheatgrass (*Bromus tectorum*) accounts for most of the annual cover, though Japanese brome (*Bromus japonicus*) was also sampled in 2002 in one quadrat. Perennial grass cover was less than 1% in 2002 and increased slightly to 3% in 2007. Bluebunch wheatgrass (*Agropyron spicatum*) is the dominant perennial species. Bulbous bluegrass (*Poa bulbosa*) is also present, and although it is a perennial species, it has a phenology that is similar to annual grasses (Stewart and Hull 1949) and may limit the establishment of other species.

Annual species also dominate the forb component. The cover of annual forbs increased from 1% in 2002 to 4% in 2007, while that of perennial species was less than 1% in both sample years. The dominant forb species are holosteum (*Holosteum umbellatum*) and storksbill (*Erodium cicutarium*). Storksbill has been found to limit the establishment of other species (Kimball and Schiffman 2003).

2007 TREND ASSESSMENT

The browse trend is down. The density of sagebrush decreased 33%. Although seedling plants were sampled for the first time, they occurred at a low frequency. Young plants decreased slightly from 3% of the population to 2%. However, decadence decreased from 25% of the population to 12%, and plants classified as dying decreased from 17% to 4%. The browse use also shifted from light-moderate to moderate-heavy, and heavily browsed plants increased from 20% of the population to 52%. Decadence and browse use also increased on the few cliffrose plants present. The grass trend is slightly up. The sum of nested frequency of perennial grasses increased considerably, but perennial grasses continued to have low abundance. The nested frequencies of bluebunch wheatgrass and Sandberg bluegrass (*Poa secunda*) significantly increased. However, there was also a significant increase in the nested frequency of cheatgrass. The forb trend is slightly down. The sum of nested frequency of perennial forbs changed little. However, there was a significant increase in the nested frequency of storksbill, and quadrat frequency increased from 10% to 46%. The 2002 Desirable Components Index (DCI) score was very poor because browse cover was less than the 5% threshold, annual grass cover was high, and perennial grass and forb cover were low. In 2007, the DCI score remained very poor.

2002 winter range condition (DCI) - very poor (-15) Mid-level potential scale
2007 winter range condition (DCI) - very poor (-10) Mid-level potential scale
browse - down (-2) grass - slightly up (+1) forb - slightly down (-1)

HERBACEOUS TRENDS --
Management unit 17 , Study no: 61

Type	Species	Nested Frequency '02	Nested Frequency '07	Average Cover % '02	Average Cover % '07
G	Agropyron smithii	-	2	-	.00
G	Agropyron spicatum	$_{a}$2	$_{b}$66	.03	1.92
G	Bromus japonicus (a)	3	-	.00	-
G	Bromus tectorum (a)	$_{a}$425	$_{b}$457	41.21	37.77
G	Poa bulbosa	$_{a}$6	$_{a}$14	.01	.44

Type	Species	Nested Frequency '02	Nested Frequency '07	Average Cover % '02	Average Cover % '07
G	Poa secunda	$_{a}$1	$_{b}$46	.00	.38
Total for Annual Grasses		428	457	41.22	37.77
Total for Perennial Grasses		9	128	0.04	2.75
Total for Grasses		437	585	41.27	40.52
F	Alyssum alyssoides (a)	$_{a}$63	$_{a}$54	.18	.17
F	Collinsia parviflora (a)	-	2	-	.01
F	Cryptantha sp.	-	3	-	.01
F	Descurainia pinnata (a)	$_{a}$4	$_{a}$7	.01	.02
F	Draba sp. (a)	$_{a}$4	$_{b}$38	.01	.06
F	Erodium cicutarium (a)	$_{a}$30	$_{b}$134	.56	1.95
F	Heterotheca villosa	1	-	.00	-
F	Holosteum umbellatum (a)	$_{a}$3	$_{b}$199	.01	1.48
F	Lappula occidentalis (a)	-	16	-	.03
F	Ranunculus testiculatus (a)	$_{a}$5	$_{a}$2	.19	.00
F	Salsola iberica (a)	1	-	.00	-
F	Sisymbrium altissimum (a)	$_{a}$5	$_{a}$7	.24	.08
F	Tragopogon dubius	-	1	-	.00
Total for Annual Forbs		115	459	1.21	3.82
Total for Perennial Forbs		1	4	0.00	0.02
Total for Forbs		116	463	1.22	3.84

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

BROWSE TRENDS --
Management unit 17 , Study no: 61

Type	Species	Strip Frequency '02	Strip Frequency '07	Average Cover % '02	Average Cover % '07
B	Artemisia tridentata vaseyana	40	26	3.49	3.37
B	Chrysothamnus nauseosus albicaulis	1	1	-	-
B	Cowania mexicana stansburiana	6	6	.45	.53
B	Gutierrezia sarothrae	0	4	-	.06
B	Juniperus osteosperma	5	5	7.80	4.60
B	Opuntia sp.	4	4	-	-
Total for Browse		56	46	11.74	8.57

CANOPY COVER, LINE INTERCEPT --
Management unit 17 , Study no: 61

Species	Percent Cover	
	'02	'07
Artemisia tridentata vaseyana	4.36	7.19
Cowania mexicana stansburiana	2.59	1.04
Gutierrezia sarothrae	-	.15
Juniperus osteosperma	14.83	15.89
Opuntia sp.	-	.15

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 17 , Study no: 61

Species	Average leader growth (in)	
	'02	'07
Artemisia tridentata vaseyana	3.1	1.4
Cowania mexicana stansburiana	3.8	1.9

POINT-QUARTER TREE DATA --
Management unit 17 , Study no: 61

Species	Trees per Acre	
	'02	'07
Juniperus osteosperma	41	39

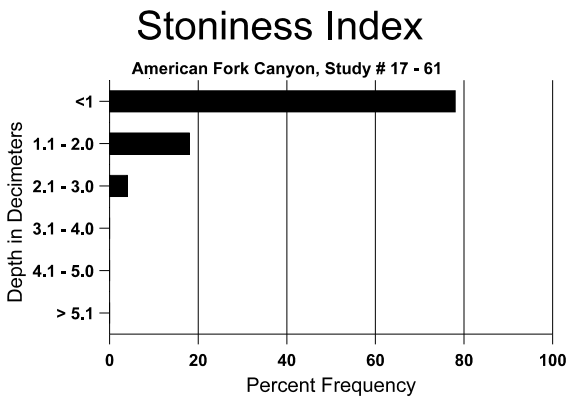
Average diameter (in)	
'02	'07
9.1	12.5

BASIC COVER --
Management unit 17 , Study no: 61

Cover Type	Average Cover %	
	'02	'07
Vegetation	52.60	51.55
Rock	21.68	17.44
Pavement	1.52	.33
Litter	40.96	43.37
Cryptogams	.09	.34
Bare Ground	4.66	1.52

SOIL ANALYSIS DATA --
Herd Unit 17, Study no: 61, American Fork Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	Loam			%0M	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
9.8	73.3 (13.0)	7.4	29.3	46.7	24.0	6.3	105.6	313.6	.9



PELLET GROUP DATA --
Management unit 17 , Study no: 61

Type	Quadrat Frequency		Days use per acre (ha)	
	'02	'07	'02	'07
Bighorn Sheep	33	17	56 (137)	33 (81)
Rabbit	18	8	-	-
Elk	7	3	17 (43)	7 (17)
Deer	13	23	29 (73)	23 (56)

BROWSE CHARACTERISTICS --
Management unit 17 , Study no: 61

		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)
Artemisia tridentata vaseyana												
02	**1500**	-	40	1080	380	540	19	20	25	17	17	22/31
07	**1000**	80	20	860	120	640	30	52	12	4	4	24/36
Chrysothamnus nauseosus albicaulis												
02	**20**	-	-	-	20	140	0	0	100	-	0	23/44
07	**20**	-	-	-	20	-	0	0	100	-	0	26/38
Cowania mexicana stansburiana												
02	**120**	-	-	40	80	80	50	50	67	17	17	39/43
07	**120**	-	-	20	100	-	33	67	83	17	17	53/50

		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)
Gutierrezia sarothrae												
02	**0**	-	-	-	-	60	0	0	-	-	0	-/-
07	**100**	-	-	100	-	-	0	0	-	-	0	8/10
Juniperus osteosperma												
02	**100**	-	-	100	-	20	0	0	-	-	0	-/-
07	**100**	-	-	100	-	20	0	0	-	-	0	-/-
Opuntia sp.												
02	**80**	-	20	60	-	-	0	0	-	-	0	3/5
07	**120**	-	20	100	-	-	0	0	-	-	0	4/15