Trend Study 4-4-06

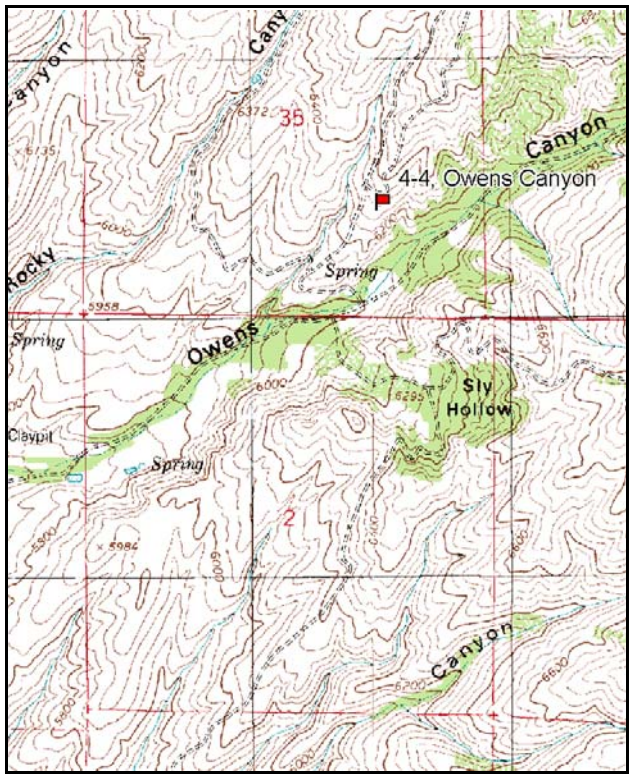
Study site name: Owen's Canyon . Vegetation type: Burned and Seeded .

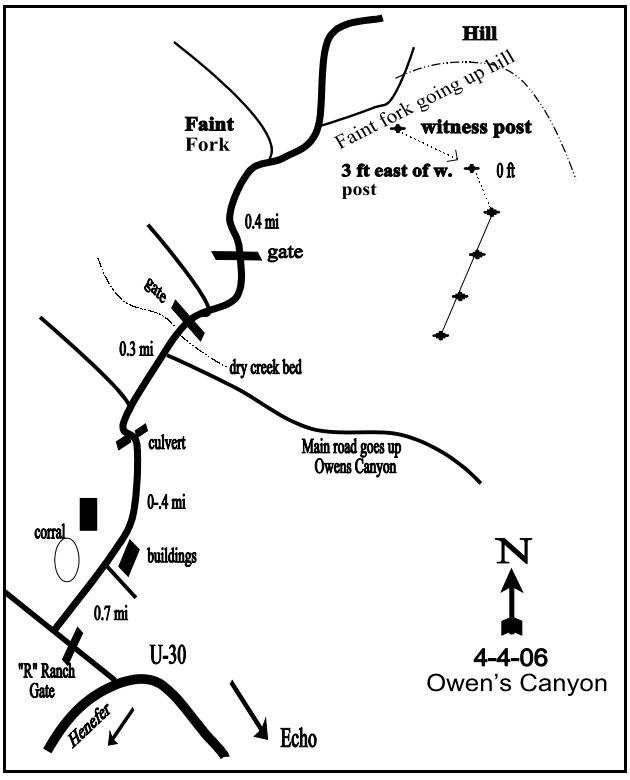
Compass bearing: frequency baseline 160 degrees magnetic.

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

LOCATION DESCRIPTION

From the "R" Ranch main gate (contact Tiny Wostinhume for key or access through Tank Canyon), proceed 0.7 miles to the ranch buildings and a fork. Take the left fork through a white post entrance Continue straight 0.4 miles to a culvert, then 0.45 miles further to a DWR gate. Continue through the gate 0.25 miles, turn left, cross the wash, stay on main road (left fork leads to DWR cabin). Proceed 0.4 miles to a fork in the road. Continue right for 0.3 miles. A witness post is three feet from the 0-foot stake. The 0-foot baseline stake is marked by browse tag #7945. The baseline doglegs after the 100-foot baseline stake and runs 214 degrees magnetic.





Map Name: Henefer

Diagrammatic Sketch

Township 4N , Range 4E , Section 35

UTM NAD 27, UTM 12T 4542410 N 461470 E

DISCUSSION

Owen's Canyon - Trend Study No. 4-4

Study Information

This study samples a mountain big sagebrush/grass type on important winter range. It is located on Division of Wildlife Resources property on the north side of Owen's Canyon (elevation: 6,300 feet, slope: 30%, aspect: south). A fire burned the entire area prior to the 2001 reading and decimated the sagebrush and other browse species. Cattle and sheep, owned by ranchers to the north and south of the property, graze the lower elevations of the WMA from April 15 to July 15. Deer pellet groups were moderately abundant during the 1984 reading and forage utilization was not exceptionally heavy. During the 1996 reading, few deer and elk pellet groups were encountered. Some cattle also grazed the area in 1996. The pellet group transect in 2001 estimated 9 elk and 4 deer days use/acre (23 edu/ha and 10 ddu/ha). In 2006, 66 elk, 5 deer, and 9 cow days use/acre (164 edu/ha, 12 ddu/ha, and 23 cdu/ha) were estimated from the pellet group transect sampling.

Soil

The soil is in the Horrocks-Cutoff series complex which is moderately deep, well drained, moderately permeable and formed in glacial deposits, residuum, and colluvium derived from andesite, quarzite, sandstone, and conglomerate (USDA-NRCS 2006). It is gravelly and the effective rooting depth was estimated at only about 10 inches. Soil texture is a clay loam with a neutral soil reaction (pH of 6.7). Drainage is probably excessive and soil moisture may be limited in the upper horizons during midsummer. The soil erosion potential is high because of the soil texture and steep slope, but the high vegetation and litter cover prevents high soil loss. The bare ground cover increased after the fire from 1% in 1996 to 13-16% in 2001 and 2006. The erosion condition class was determined as stable in 2001 and 2006.

Browse

The sagebrush was classified as mountain big sagebrush, but also had characteristics of basin big sagebrush. Prior to the burn in 1996, mountain big sagebrush provided 20% cover. The population density previous to the fire was around 4,000 plants/acre in 1984 and 1990 and 3,420 plants/acre in 1996. In 1996, the population was mostly mature, lightly to moderately hedged, in good vigor, with a low percent decadency. In 2001, the first reading following the fire, only 60 young sagebrush plants/acre and 140 seedlings/acre were sampled. In 2006, sagebrush density increased to 180 plants/acre, all of which were classified as mature.

Forage kochia was seeded following the fire and has become the key browse species. In 2001, 1,460 plants/acre were sampled, 71% of which were classified as young. In 2006, 2,520 plants/acre were sampled, 67% of which were mature; an estimated 6,380 seedlings/acre were also sampled. The kochia appears to be establishing well despite the dense herbaceous understory. Kochia cover was about 1% in 2006. Stickyleaf rabbitbrush density did not change after the fire.

Herbaceous Understory

Grasses have dominated the herbaceous understory. Cheatgrass and Japanese brome were common and provided a combined 20% cover in 1996. After the burn, cheatgrass and Japanese brome provided only 3% cover. The most abundant herbaceous plants are the exotic perennial grasses crested wheatgrass, intermediate wheatgrass, and smooth brome, all of which were seeded previous to the burn. They provided the majority of forage for big game. Several other native perennial grasses are found, but only western wheatgrass is abundant. The majority of forbs are weedy biennials and annuals. The only common perennial forbs are yellow salsify and American vetch. Pale alyssum and storksbill are very common annual forbs.

1990 TREND ASSESSMENT

The sagebrush population on this important winter range is stable. Decadence increased from 17% to 43% of the population, but the density of decadent plants is equal to the sum of seedling and young age class plants. Twenty-one percent of the available sagebrush have a heavily hedged growth form. Sagebrush canopy cover

is estimated at 18%. Broom snakeweed is uncommon, but has actually decreased. Crested wheatgrass shows a significant increase in sum of nested frequency. There is an adequate amount of litter cover with no evidence of erosion. The grass trend is up. The nested frequency of perennial grasses increased 73%, most of which was crested wheatgrass. The forb trend is stable. The nested frequency of perennial forbs changed little.

browse - stable (0) grass - up (+2) forb - stable (0)

1996 TREND ASSESSMENT

Trend for browse is stable. Sagebrush density has declined slightly, but the changes in density are likely due to the larger sample size used beginning in 1992, which better estimates shrub populations with clumped and/or discontinuous distributions. Heavy use and percent decadence have declined and vigor has improved. Seedlings and young are not abundant and likely have a difficult time competing with the extremely high densities of winter annuals. The grass trend is slightly up. The nested frequency of perennial grasses increased 26%. The nested frequency and cover of annual grasses is high, which increases the potential for the site to burn and increases competition with sagebrush seedlings. The forb trend is up. The nested frequency of perennial forbs incread nearly five-fold. Northern sweetvetch and American vetch increased significantly. The Desirable Components Index score was fair due to low browse cover, moderate browse decadence, good perennial grass cover, but high annual grass cover prevented a higher score.

winter range condition (DC Index) - fair (54) Mid-level potential scale
browse - stable (0) grass -slightly up (+1) forb - up (+2)

2001 TREND ASSESSMENT

Trend for browse is down due to loss of nearly all browse to fire. The site currently supports a few seedling and young sagebrush, resprouting stickyleaf low rabbit brush, and seeded forage kochia. A healthy kohcia population established (1,460 plants/acre), but this does not replace the sagebrush. The grass trend is up. The nested frequency of perennial grasses, excluding bulbous bluegrass, increased 16%, even with a significant decrease of crested wheatgrass. The nested frequency of annual grasses decreased 70%, both Japanese brome and cheatgrass decreased significantly. Annual grass cover decreased from 20 to 3%. The forb trend is stable. The nested frequency of perennial forbs did not change despite the fire, although the weedy western ragweed, prickly lettuce, and curly cup gumweed established after the fire. Yellow sweetclover and small burnet, both preferred species, were seeded and established. Weedy annual species increased substantially because of the fire. The Desirable Components Index score decreased to very poor to poor due to a complete loss of browse cover.

winter range condition (DC Index) - very poor to poor (33) Mid-level potential scale
browse - down (-2) grass - up (+2) forb - stable (0)

2006 TREND ASSESSMENT

The browse trend is slightly up. The mountain big sagebrush density remains very low despite heavy use. The forage kochia density increased 42% and the majority of the population consists of established mature plants. Although the kochia has increased substantially in density, it still only provides 1% cover and mature plants average 10 inches in height. Stickyleaf rabbitbrush densities have not changed. The grass trend is slightly up. The nested frequency of perennial grasses, excluding bulbous bluegrass, increased 14%. However, cheatgrass increased significantly, but the nested frequency value was nearly half that of 1996. The forb trend is up. The nested frequency of perennial forbs increased 23% and the nested frequencies of yellow salsify and American sweetvetch increased significantly. The Desirable Components Index score is very poor due to an increase in annual grass cover.

winter range condition (DC Index) - very poor (33) Mid-level potential scale
browse - slightly up (+1) grass - slightly up (+1) forb - up (+2)

HERBACEOUS TRENDS --
Management unit 04 , Study no: 4

Type	Species	Nested Frequency					Average Cover %		
		'84	'90	'96	'01	'06	'96	'01	'06
G	Agropyron cristatum	a70	c132	bc133	ab87	bc127	6.62	5.27	8.26
G	Agropyron intermedium	a1	a8	a15	b55	b77	.69	3.37	5.58
G	Agropyron smithii	a-	a-	b29	b45	b42	.39	4.52	3.94
G	Agropyron spicatum	3	-	2	-	4	.01	-	.76
G	Bromus inermis	a50	ab83	b99	b105	b113	3.80	9.85	8.68
G	Bromus japonicus (a)	-	-	b203	a73	a89	4.48	.50	.79
G	Bromus tectorum (a)	-	-	c321	a84	b178	15.25	1.99	9.26
G	Dactylis glomerata	a-	a-	a-	b21	a1	-	.35	.15
G	Oryzopsis hymenoides	-	2	4	10	4	.03	.36	.15
G	Poa bulbosa	a-	a-	a2	ab26	b39	.01	1.43	1.12
G	Poa fendleriana	-	-	-	4	-	-	.15	-
G	Poa pratensis	-	2	5	8	1	.09	.18	.03
G	Poa secunda	a-	a1	a2	a-	b13	.03	-	.30
G	Sitanion hystrix	b9	a2	a-	a-	a-	-	-	.00
Total for Annual Grasses		0	0	524	157	267	19.74	2.50	10.05
Total for Perennial Grasses		133	230	291	361	421	11.68	25.51	29.01
Total for Grasses		133	230	815	518	688	31.43	28.01	39.06
F	Agoseris glauca	-	-	-	3	-	-	.00	-
F	Alyssum alyssoides (a)	-	-	a157	c324	b279	.81	25.80	2.18
F	Allium sp.	a-	a-	a-	c32	b9	-	.20	.02
F	Ambrosia psilostachya	-	-	-	7	-	-	.04	-
F	Arabis sp.	ab2	b13	ab2	a-	a-	.01	-	-
F	Arenaria sp.	-	-	-	-	4	-	-	.03
F	Aster sp.	-	-	4	7	6	.03	.18	.18
F	Astragalus sp.	-	-	2	1	-	.03	.03	-
F	Camelina microcarpa (a)	-	-	a4	b23	a-	.38	.06	-
F	Carduus nutans (a)	-	-	-	-	-	-	.03	-
F	Calochortus nuttallii	-	-	-	3	-	-	.00	-
F	Cirsium undulatum	-	2	8	5	-	.06	.01	-
F	Collomia linearis (a)	-	-	a-	b14	b19	-	.02	.08
F	Collinsia parviflora (a)	-	-	a3	b45	c60	.00	.68	.15
F	Cymopterus sp.	-	-	1	-	7	.00	-	.07
F	Descurainia pinnata (a)	-	-	-	10	3	-	.04	.00
F	Draba sp. (a)	-	-	a-	b18	c41	-	.04	.08
F	Epilobium brachycarpum (a)	-	-	a-	b39	b57	-	.75	.31

Type	Species	Nested Frequency					Average Cover %		
		'84	'90	'96	'01	'06	'96	'01	'06
F	Erodium cicutarium (a)	-	-	$_{a}$-	$_{b}$70	$_{b}$69	-	3.65	1.08
F	Erigeron strigosis	-	-	5	-	-	.03	-	-
F	Gayophytum ramosissimum(a)	-	-	-	-	2	-	-	.00
F	Grindelia squarrosa	8	-	-	3	1	-	.03	.03
F	Helianthus annuus (a)	-	-	$_{a}$-	$_{a}$-	$_{b}$16	-	-	.07
F	Hedysarum boreale	$_{a}$-	$_{a}$-	$_{b}$40	$_{a}$-	$_{a}$-	.42	-	-
F	Holosteum umbellatum (a)	-	-	$_{a}$31	$_{b}$69	$_{c}$128	.36	.43	.47
F	Lappula occidentalis (a)	-	-	-	-	2	-	-	.00
F	Lactuca serriola	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$17	$_{b}$14	-	.06	.04
F	Machaeranthera spp	-	-	6	-	-	.01	-	-
F	Melilotus officinalis	-	-	-	5	-	-	.18	.03
F	Medicago sativa	-	-	-	-	-	-	-	.15
F	Microsteris gracilis (a)	-	-	$_{a}$-	$_{b}$12	$_{c}$44	-	.08	.09
F	Oenothera caespitosa	3	-	-	-	-	-	-	-
F	Penstemon sp.	-	-	-	1	-	-	.03	-
F	Phlox longifolia	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$14	$_{a}$-	-	.36	-
F	Polygonum douglasii (a)	-	-	3	3	6	.00	.01	.01
F	Ranunculus testiculatus (a)	-	-	$_{a}$3	$_{a}$8	$_{b}$90	.00	.04	.50
F	Sanguisorba minor	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$7	$_{a}$-	-	.66	-
F	Sisymbrium altissimum (a)	-	-	$_{a}$-	$_{b}$25	$_{a}$1	-	.21	.00
F	Sphaeralcea coccinea	-	-	-	4	1	-	.21	.00
F	Tragopogon dubius	$_{a}$6	$_{a}$6	$_{a}$20	$_{a}$12	$_{b}$81	.16	.10	1.50
F	Vicia americana	$_{a}$-	$_{ab}$4	$_{c}$61	$_{b}$29	$_{c}$62	.36	.26	.94
Total for Annual Forbs		0	0	201	660	817	1.57	31.87	5.06
Total for Perennial Forbs		19	25	149	150	185	1.14	2.39	3.02
Total for Forbs		19	25	350	810	1002	2.72	34.26	8.08

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

BROWSE TRENDS --
Management unit 04 , Study no: 4

Type	Species	Strip Frequency			Average Cover %		
		'96	'01	'06	'96	'01	'06
B	Amelanchier alnifolia	3	0	1	-	-	.15
B	Artemisia tridentata vaseyana	82	3	7	19.85	-	.15
B	Chrysothamnus nauseosus albicaulis	7	0	0	.83	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	16	16	14	.97	.36	.59
B	Gutierrezia sarothrae	1	1	0	.07	-	-
B	Kochia prostrata	0	37	43	-	.35	1.04
B	Symphoricarpos oreophilus	1	0	0	-	-	-
Total for Browse		110	57	65	21.72	0.70	1.94

CANOPY COVER, LINE INTERCEPT --
Management unit 04 , Study no: 4

Species	Percent Cover '06
Amelanchier alnifolia	.18
Artemisia tridentata vaseyana	.31
Chrysothamnus viscidiflorus viscidiflorus	1.03
Kochia prostrata	2.29

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 04 , Study no: 4

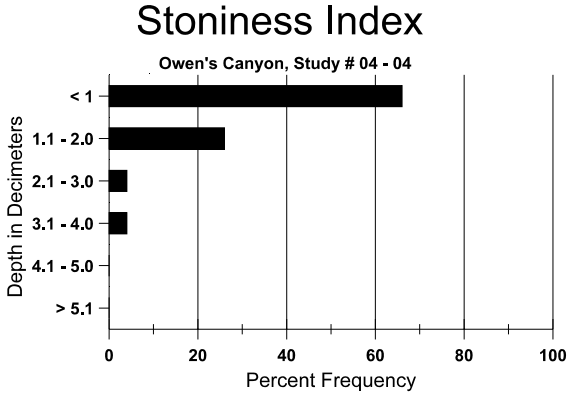
Species	Average leader growth (in) '06
Artemisia tridentata vaseyana	2.7

BASIC COVER --
Management unit 04 , Study no: 4

Cover Type	Average Cover %				
	'84	'90	'96	'01	'06
Vegetation	.75	8.50	50.47	63.19	44.72
Rock	0	7.00	2.49	4.01	4.59
Pavement	25.50	11.75	2.90	5.78	5.42
Litter	0	61.50	68.31	32.54	42.84
Cryptogams	2.00	0	.95	.00	.00
Bare Ground	0	11.25	1.56	15.32	18.73

SOIL ANALYSIS DATA --
Herd Unit 04, Study no: 04, Owen's Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	Clay loam			%0M	PPM P	PPM K	dS/m
			%sand	%silt	%clay				
9.8	66.0 (9.35)	6.7	44.6	27.4	28.0	3.2	22.4	176.0	0.4



PELLET GROUP DATA --
Management unit 04 , Study no: 4

Type	Quadrat Frequency		
	'96	'01	'06
Rabbit	1	-	1
Elk	4	3	49
Deer	12	3	2
Cattle	1	-	4

Days use per acre (ha)	
'01	'06
-	-
9 (23)	66 (164)
4 (10)	5 (12)
-	9 (23)

BROWSE CHARACTERISTICS --
Management unit 04 , Study no: 4

		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 alnifolia												
84	**0**	-	-	-	-	-	0	0	-	-	0	-/-
90	**0**	-	-	-	-	-	0	0	-	-	0	-/-
96	**60**	-	20	40	-	-	0	0	-	-	0	25/20
01	**0**	-	-	-	-	-	0	0	-	-	0	12/9
06	**20**	-	-	20	-	-	100	0	-	-	0	17/26
Artemisia tridentata vaseyana												
84	**3966**	133	1000	2300	666	-	61	11	17	-	3	23/32
90	**4098**	1066	866	1466	1766	-	56	20	43	8	17	14/17
96	**3420**	120	320	2360	740	1180	13	2	22	3	6	26/45
01	**60**	140	60	-	-	-	0	0	0	-	0	-/-
06	**180**	-	-	180	-	-	11	78	0	-	0	14/13
Chrysothamnus nauseosus albicaulis												
84	**33**	-	-	33	-	-	0	0	0	-	0	9/6
90	**99**	33	33	-	66	-	0	0	67	-	0	-/-
96	**160**	-	20	80	60	-	0	0	38	-	0	24/34
01	**0**	-	-	-	-	-	0	0	0	-	0	-/-
06	**0**	-	-	-	-	-	0	0	0	-	0	21/23
Chrysothamnus viscidiflorus viscidiflorus												
84	**33**	-	-	-	33	-	0	0	100	-	0	-/-
90	**33**	-	-	33	-	-	100	0	0	-	100	6/8
96	**420**	-	40	340	40	20	0	0	10	-	0	14/22
01	**460**	-	-	460	-	-	0	0	0	-	0	11/16
06	**400**	-	40	340	20	-	10	0	5	5	5	14/24
Gutierrezia sarothrae												
84	**1133**	-	-	1100	33	-	0	0	3	-	0	12/6
90	**33**	33	-	33	-	-	0	0	0	-	0	5/6
96	**200**	180	40	160	-	-	0	0	0	-	0	10/12
01	**20**	-	-	20	-	-	0	0	0	-	0	-/-
06	**0**	-	-	-	-	-	0	0	0	-	0	-/-

		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)
Kochia prostrata												
84	**0**	-	-	-	-	-	0	0	-	-	0	-/-
90	**0**	-	-	-	-	-	0	0	-	-	0	-/-
96	**0**	-	-	-	-	-	0	0	-	-	0	-/-
01	**1460**	20	1040	420	-	-	0	0	-	-	0	4/6
06	**2520**	6380	820	1700	-	-	40	21	-	-	0	10/13
Symphoricarpos oreophilus												
84	**0**	-	-	-	-	-	0	0	-	-	0	-/-
90	**0**	-	-	-	-	-	0	0	-	-	0	-/-
96	**20**	-	-	20	-	-	0	0	-	-	0	17/16
01	**0**	-	-	-	-	-	0	0	-	-	0	-/-
06	**0**	-	-	-	-	-	0	0	-	-	0	18/27