Trend Study 1-15-06

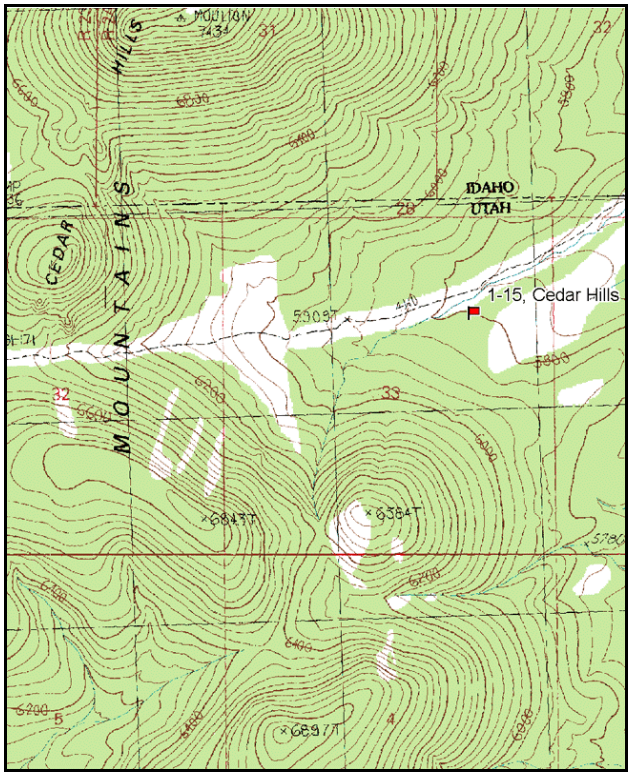
Study site name: Cedar Hills . Vegetation type: Pinyon-Juniper .

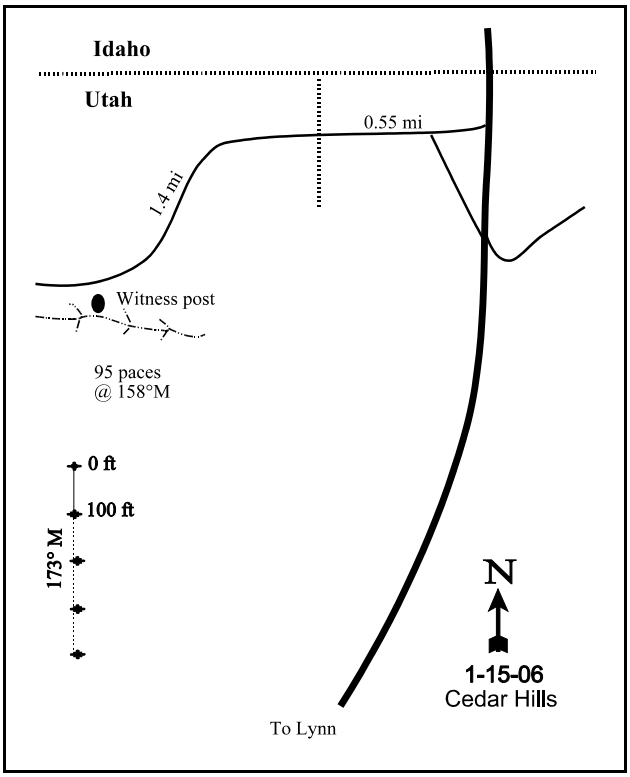
Compass bearing: frequency baseline 173 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: belt 1 on 5 ft.

LOCATION DESCRIPTION

From the town of Lynn, drive north to the Utah-Idaho border to a cattleguard. From the cattleguard at the border, follow a faint road along a fence (on south side) for 0.55 miles to a gate. Go through the next seeded pasture 0.65 miles and continue as the road turns away from the fence. Proceed 0.75 miles to a small rock pile and a witness post on the south side of the road. Cross the drainage walking about 95 paces southeast to the 0-foot stake off the baseline in the trees. The 0-foot baseline stake is labeled with browse tag #49.





Map Name: Buck Hollow, Utah-Idaho Diagrammatic Sketch

Township 15N , Range 16W , Section 33 UTM NAD 27, UTM 12T 4651431 N, 277675 E

DISCUSSION

Cedar Hills - Trend Study No. 1-15

Study Information

This trend study is located west of Yost in the Albion Mountains in an area called Cedar Hills (elevation: 5,800 feet, slope: 3-7%, aspect: north) on the Utah-Idaho border. The area was dominated by pinyon and juniper and the study was established in 1990 to provide baseline data for a proposed habitat improvement project. The area was to be chained and seeded, but the treatment never happened. In 2000 a large wildfire burned the area, which changed the area from tree dominance to herbaceous species. It is apparent that the burned area was aerially seeded, but no method was used to cover seed. Seed mix information was not available. The area is managed by the BLM and is allotted for spring and fall cattle use as part of the Junction Creek allotment. There is only light deer use. A pellet group transect in 2001 indicated no use by wildlife or livestock. In 2006, 1 deer and 30 cow days use/acre (2 ddu and 73 cdu/ha) were estimated.

Soil

The Solak soil series consists of shallow, somewhat excessively drained, moderately permeable soils that formed in residuum and colluvium weathered from conglomerate and is composed of sandstone, quartzite, and limestone (USDA-NRCS 2006). The soil is a fine-textured clay loam, with an effective rooting depth of 13 inches. The soil reaction is slightly alkaline (7.8 pH). When soil samples were taken in 1996, phosphorus was marginal at only 6.7 ppm, which could be limiting for plant growth and development (Tiedemann and Lopez 2004). There was abundant litter cover under the trees until the wildfire went through the area. Percent bare soil was high one year after the burn (72%), but was much lower in 2006 (18%). Cryptogamic cover was reduced from 13% to zero in 2001. The erosion condition was classified as moderate in 2001, with erosion limited only by the gentle terrain, but was stable in 2006 as herbaceous species had established to protect the soil.

Browse

Singleleaf pinyon and Utah juniper dominated the area prior to the fire. Point-quarter data in 1996 estimated 318 pinyon/acre (70% were seedlings) and 407 juniper/acre (only 15% were seedlings and young trees). Pinyon average diameter was 5 inches and juniper was 4 inches. Overhead canopy cover of pinyon and juniper was estimated using line intercept, at 35% which can suppresses understory species abundance and productivity (Tausch and West 1994). The wildfire in 2000 eliminated all juniper and pinyon trees.

Mountain big sagebrush was the most abundant browse species prior to the fire. Sagebrush cover was about 1% in 1996 and density was 1,160 plants/acre. Density had declined since 1990. Dead plants were very numerous in 1996 as well. Utilization was light during all sampling years. Decadence was very high in 1990 at 87% of the population and then had dropped to 45% in 1996, which is still high. The poor vigor was likely due to competition from the pinyon-juniper overstory. In 2001, no shrub species were sampled. In 2006, 120 sagebrush plants/acre were sampled. These were all classified as mature and provided as much cover as was sampled in 1996, about 1%. Seedlings were also very abundant in 2006. Without competition from pinyon and juniper trees, sagebrush plants were much larger in 2006 than they were in 1996.

Herbaceous Understory

Prior to the fire the herbaceous understory was fair for a pinyon-juniper dominated site. Sandberg bluegrass was the most abundant grass in 1996. Thickspike wheatgrass and bluebunch wheatgrass were also common prior to the fire. Thickspike wheatgrass responded very well to the fire. Nested frequency significantly increased in both 2001 and 2006. Quadrat frequency increased from 36% (1990) and 21% (1996) prior to the fire to 53% (2001) and 85% (2006). Cover increased from less than 1% pre-burn, to 3% one year after the burn to 29% six years after the burn. Seeded species that were sampled in 2006 include: crested wheatgrass, Russian wildrye, Indian ricegrass, and Canby bluegrass (*Poa canbyi*). Canby bluegrass is often taxonomically lumped together with Sandberg bluegrass (*Poa secunda*). We chose to sample these two varieties separately to

track the success of the seeded grass and the response of the residual Sandberg bluegrass. Canby bluegrass is similar to Sandberg bluegrass, but is taller and more robust. Crested wheatgrass was the most abundant seeded species in 2006 (11% quadrat frequency and 1% cover). Unfortunately, cheatgrass was sampled for the first time in 2006. Quadrat frequency was 32% and cover was 3%. Forbs are diverse. At least four different milkvetch species have been sampled. Hood's phlox was abundant prior to the fire, but was rare in 2006. Blue flax was sampled in 2006 and may have been seeded after the fire.

1996 TREND ASSESSMENT
Trend for mountain big sagebrush is in an overall state of decline but shows some improvements since 1990. Density has declined 48% since the last reading due to a reduction in decadent plants. Reproduction is limited. Without some sort of treatment, all of the sagebrush will eventually die out from competition with the overstory of trees and drought. Trend is considered down. The trend for grasses is stable. Sum of nested frequency of grasses changed very little. The forb trend is up. Perennial forbs were much more abundant.

winter range condition (DC Index) - very poor (23) Mid-level potential scale
browse - down (-2) grass - stable (0) forb - up (+2)

2001 TREND ASSESSMENT
Trend for mountain big sagebrush is down with all of it lost to the fire. Trends for grasses and forbs are also down with nested values for both grasses and forbs being severely depressed after the fire. The DCI score also declined, with the decline in browse and herbaceous vegetation.

winter range condition (DC Index) - very poor (9) Mid-level potential scale
browse - down (-2) grass - down (-2) forb - down (-2)

2006 TREND ASSESSMENT
The browse trend is slightly up. Mountain big sagebrush is slowly recovering. Seedlings were abundant, so there is potential for population growth. The grass trend is up. Residual species like thickspike wheatgrass and Sandberg bluegrass increased significantly and are abundant. Seeded grasses also established. Cheatgrass was sampled for the first time, but the abundance of perennial grasses should minimize the effect of cheatgrass. Perennial forbs were more abundant in 2006 than in 2001, but not as abundant as 1996. The DCI improved from very poor-poor with the increase of grasses and forbs. Browse is important for winter range and is lacking, which lowers the rating.

winter range condition (DC Index) - poor (39) Mid-level potential scale
browse - slightly up (+1) grass - up (+2) forb - up (+2)

HERBACEOUS TRENDS --
Management unit 01 , Study no: 15

Type	Species	Nested Frequency				Average Cover %		
		'90	'96	'01	'06	'96	'01	'06
G	Agropyron cristatum	a-	a-	a-	b26	-	-	1.18
G	Agropyron dasystachyum	a76	a60	b135	c292	.76	3.40	29.27
G	Agropyron spicatum	a37	b71	a12	a24	.48	.33	4.19
G	Bromus tectorum (a)	-	-	-	87	-	-	3.37
G	Elymus junceus	-	-	-	2	-	-	.15

Type	Species	Nested Frequency				Average Cover %		
		'90	'96	'01	'06	'96	'01	'06
G	Oryzopsis hymenoides	-	-	-	3	-	-	.18
G	Poa canbyi	-	-	-	6	-	-	.30
G	Poa secunda	$_{c}$256	$_{c}$269	$_{a}$66	$_{b}$116	4.23	.47	1.98
G	Sitanion hystrix	-	2	-	3	.01	-	.15
Total for Annual Grasses		0	0	0	87	0	0	3.37
Total for Perennial Grasses		369	402	213	472	5.49	4.21	37.43
Total for Grasses		369	402	213	559	5.49	4.21	40.81
F	Agoseris glauca	$_{a}$-	$_{a}$2	$_{a}$5	$_{b}$44	.00	.04	.20
F	Alyssum alyssoides (a)	-	$_{a}$-	$_{a}$-	$_{b}$146	-	-	.73
F	Allium sp.	-	-	-	4	-	-	.01
F	Antennaria rosea	$_{a}$1	$_{b}$10	$_{a}$-	$_{a}$-	.08	-	-
F	Arabis sp.	$_{a}$3	$_{b}$19	$_{a}$-	$_{a}$1	.04	-	.00
F	Astragalus beckwithii	$_{a}$-	$_{c}$116	$_{a}$-	$_{b}$35	2.27	-	1.70
F	Astragalus calycosus	-	-	-	2	-	-	.00
F	Astragalus cibarius	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$53	-	-	1.19
F	Astragalus convallarius	-	3	-	-	.00	-	-
F	Astragalus sp.	6	11	7	-	.08	.02	-
F	Astragalus utahensis	$_{a}$3	$_{b}$21	$_{a}$6	$_{a}$5	.13	.01	.03
F	Castilleja chromosa	-	4	-	-	.01	-	-
F	Caulanthus crassicaulis	-	-	-	-	.00	-	-
F	Camelina microcarpa (a)	-	$_{a}$-	$_{a}$-	$_{b}$40	-	-	.18
F	Chenopodium album (a)	-	-	3	-	-	.00	-
F	Chaenactis douglasii	$_{a}$10	$_{a}$13	$_{a}$4	$_{b}$35	.05	.01	.26
F	Chenopodium leptophyllum(a)	-	-	-	4	-	-	.01
F	Collinsia parviflora (a)	-	$_{a}$87	$_{b}$127	$_{c}$225	.18	.65	1.72
F	Crepis acuminata	$_{a}$3	$_{ab}$9	$_{ab}$6	$_{b}$16	.10	.02	.42
F	Cryptantha sp.	$_{Ab}$7	$_{ab}$5	$_{a}$-	$_{b}$16	.04	-	.03
F	Descurainia pinnata (a)	-	-	1	4	-	.03	.01
F	Epilobium brachycarpum (a)	-	$_{a}$-	$_{a}$-	$_{b}$81	-	-	.25
F	Erigeron sp.	2	6	-	-	.04	-	-
F	Erigeron pumilus	-	1	-	1	.00	-	.00
F	Fritillaria atropurpurea	-	-	5	1	-	.01	.00
F	Gayophytum ramosissimum(a)	-	-	-	8	-	-	.04
F	Haplopappus acaulis	$_{b}$9	$_{c}$25	$_{a}$-	$_{a}$-	.38	-	-
F	Hackelia patens	-	-	1	-	-	.00	-
F	Lappula occidentalis (a)	-	-	-	5	-	-	.01

Type	Species	Nested Frequency				Average Cover %		
		'90	'96	'01	'06	'96	'01	'06
F	Lactuca serriola	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$71	-	-	.23
F	Linum lewisii	-	-	-	9	-	-	.21
F	Mentzelia albicaulis (a)	-	-	-	1	-	-	.00
F	Microsteris gracilis (a)	-	$_{a}$-	$_{a}$-	$_{b}$13	-	-	.02
F	Penstemon sp.	$_{ab}$2	$_{b}$14	$_{a}$-	$_{b}$8	.43	-	.22
F	Phlox hoodii	$_{b}$111	$_{c}$178	$_{a}$3	$_{a}$3	3.77	.00	.01
F	Senecio multilobatus	$_{ab}$14	$_{b}$29	$_{a}$3	$_{b}$21	.07	.00	.39
F	Sisymbrium altissimum (a)	-	$_{a}$-	$_{a}$-	$_{b}$30	-	-	.19
F	Taraxacum officinale	-	-	1	-	-	.00	-
F	Townsendia sp.	-	4	-	-	.01	-	-
F	Zigadenus paniculatus	$_{a}$-	$_{a}$-	$_{b}$20	$_{a}$5	.01	.37	.03
Total for Annual Forbs		0	87	131	557	0.18	0.68	3.19
Total for Perennial Forbs		171	470	61	330	7.55	0.50	5.00
Total for Forbs		171	557	192	887	7.73	1.19	8.19

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

BROWSE TRENDS --
Management unit 01 , Study no: 15

Type	Species	Strip Frequency			Average Cover %		
		'96	'01	'06	'96	'01	'06
B	Artemisia tridentata vaseyana	35	0	4	1.05	-	1.02
B	Chrysothamnus nauseosus	0	0	2	-	-	.03
B	Chrysothamnus nauseosus consimilis	1	0	0	.03	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	7	0	4	.04	-	.03
B	Juniperus osteosperma	34	0	0	9.75	-	-
B	Opuntia sp.	1	0	0	-	-	-
B	Pinus monophylla	9	0	0	1.65	-	-
B	Symphoricarpos oreophilus	7	0	4	.30	.00	.41
Total for Browse		94	0	14	12.84	0.00	1.50

CANOPY COVER, LINE INTERCEPT --
Management unit 01 , Study no: 15

Species	Percent Cover '06
Artemisia tridentata vaseyana	1.11
Chrysothamnus viscidiflorus viscidiflorus	.28
Symphoricarpos oreophilus	.03

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 01 , Study no: 15

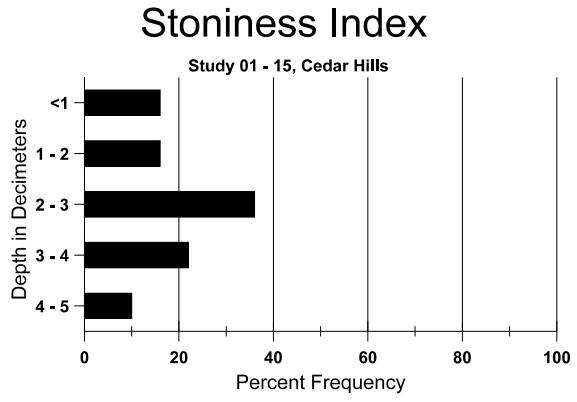
Species	Average leader growth (in)	
	'01	'06
Artemisia tridentata vaseyana	-	3.0

BASIC COVER --
Management unit 01 , Study no: 15

Cover Type	Average Cover %			
	'90	'96	'01	'06
Vegetation	4.00	26.79	6.07	48.36
Rock	1.50	.71	.24	.93
Pavement	11.25	9.01	13.58	3.52
Litter	54.75	40.83	11.15	38.81
Cryptogams	7.75	12.89	0	1.12
Bare Ground	20.75	9.32	72.24	17.68

SOIL ANALYSIS DATA --
Herd Unit 01, Study no: 15, Cedar Hills

Effective rooting depth (in)	Temp °F (depth)	PH	Clay loam			%0M	PPM P	PPM K	dS/m
			%sand	%silt	%clay				
12.7	57.4 (13.0)	7.8	30.7	40	29.3	3.0	6.7	390.4	0.6



PELLET GROUP DATA --
Management unit 01 , Study no: 15

Type	Quadrat Frequency		
	'96	'01	'06
Rabbit	14	-	4
Deer	4	-	2
Cattle	-	-	7

Days use per acre (ha)	
'01	'06
-	-
-	1 (2)
-	30 (73)

BROWSE CHARACTERISTICS --
Management unit 01 , Study no: 15

		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												
90	**2232**	-	33	266	1933	-	1	0	87	34	57	20/18
96	**1160**	-	100	540	520	1860	7	0	45	21	22	15/18
01	**0**	-	-	-	-	-	0	0	0	-	0	-/-
06	**120**	2280	-	120	-	-	0	0	0	-	0	31/31
Chrysothamnus nauseosus												
90	**0**	-	-	-	-	-	0	0	-	-	0	-/-
96	**0**	-	-	-	-	-	0	0	-	-	0	-/-
01	**0**	-	-	-	-	-	0	0	-	-	0	-/-
06	**80**	-	80	-	-	-	0	0	-	-	0	22/26
Chrysothamnus nauseosus consimilis												
90	**0**	-	-	-	-	-	0	0	-	-	0	-/-
96	**20**	-	20	-	-	-	0	0	-	-	0	-/-
01	**0**	-	-	-	-	-	0	0	-	-	0	-/-
06	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Chrysothamnus viscidiflorus viscidiflorus												
90	**666**	-	200	33	433	-	0	0	65	18	30	7/8
96	**200**	-	40	160	-	-	0	0	0	-	0	7/7
01	**0**	-	-	-	-	-	0	0	0	-	0	-/-
06	**120**	-	-	120	-	-	0	0	0	-	0	13/16
Juniperus osteosperma												
90	**499**	-	33	433	33	-	0	0	7	-	7	108/61
96	**900**	-	160	720	20	20	0	0	2	2	2	-/-
01	**0**	-	-	-	-	-	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)
Opuntia sp.												
90	**0**	-	-	-	-	-	0	0	-	-	0	-/-
96	**20**	-	-	20	-	-	0	0	-	-	0	5/9
01	**0**	-	-	-	-	-	0	0	-	-	0	-/-
06	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Pinus monophylla												
90	**66**	166	-	66	-	-	0	0	-	-	0	157/97
96	**180**	180	100	80	-	-	0	0	-	-	0	-/-
01	**0**	-	-	-	-	-	0	0	-	-	0	-/-
06	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Symphoricarpos oreophilus												
90	**33**	-	-	33	-	-	0	0	-	-	0	6/9
96	**160**	20	120	40	-	-	0	0	-	-	0	11/17
01	**0**	-	-	-	-	-	0	0	-	-	0	-/-
06	**140**	-	80	60	-	-	0	0	-	-	0	12/22