

Trend Study 11B-15-05

Study site name: Twin Hollow .

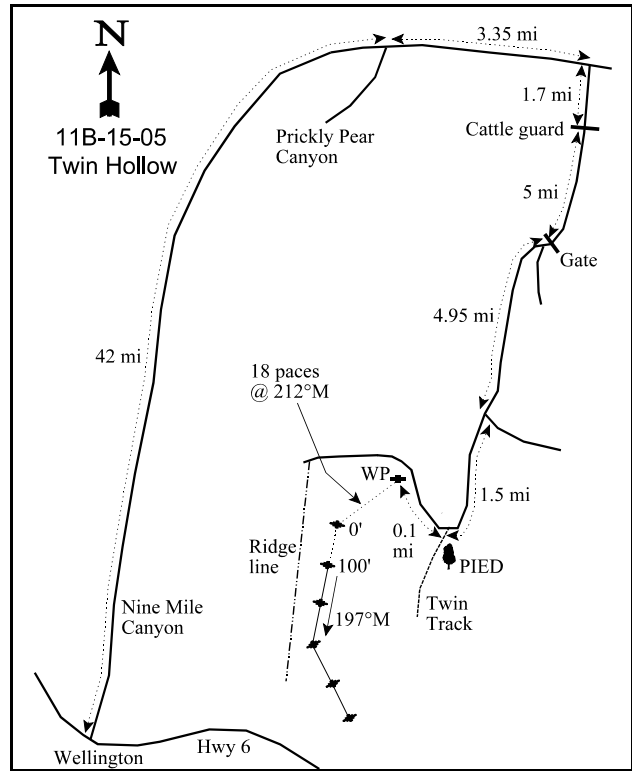
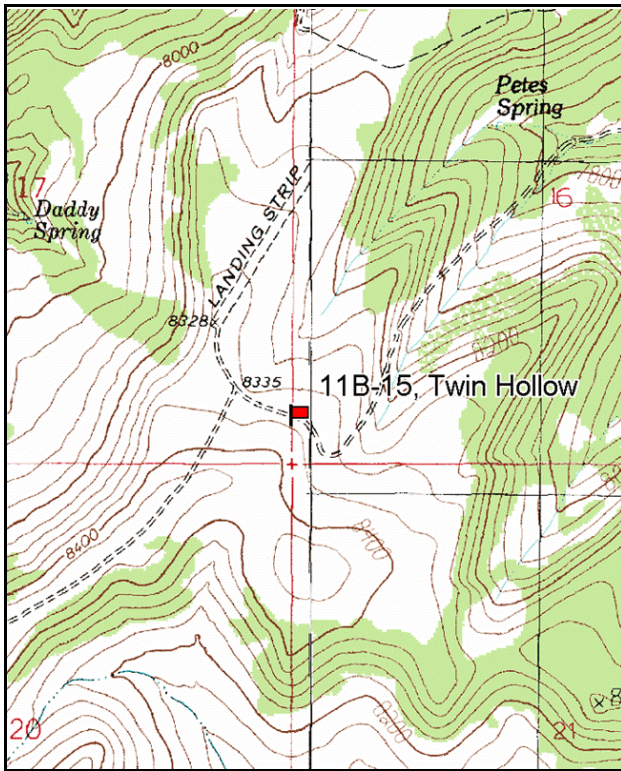
Vegetation type: Mountain Brush .

Compass bearing: frequency baseline 197 degrees magnetic (line4-5 174°M).

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

LOCATION DESCRIPTION

On the Nine Mile Canyon road, continue 3.35 miles past the turn to Prickly Pear Canyon. Turn right (south) and drive up Cottonwood Canyon. Continue 1.7 miles to a cattle guard. Drive an additional 5 miles to a gate. At the gate turn right and drive 4.95 miles to a fork. Continue straight 1.5 miles to a Y intersection (left is twin track) On the south side of the intersection is a large lone pinyon pine tree. Continue on the main road another 0.1 mile to a witness post on the left side of the road. The 0 foot stake is 18 paces away at a bearing of 212°M.



Map Name: Bruin Point

Diagrammatic Sketch

Township 13S, Range 15E, Section 15

GPS: NAD 27, UTM 12S 4393183 N, 564281 E

DISCUSSION

Twin Hollow - Trend Study No. 11B-15

The Twin Hollow study was established in 1994 to monitor critical winter range for elk and a transitional range for deer in most winters. It samples a mountain brush type at an elevation of 8,400 feet, just off a ridge with a slight southeast aspect. Slope is 20-25%. Pellet group transect data taken during the 2000 reading estimated 68 elk and only 5 deer days use/acre (168 edu/ha and 12 ddu/ha). Most of the elk pellet groups were concentrated on a ridge to the west of the study site baseline. The area is also utilized by a small band of wild horses with pellet group data estimating 12 horse days use/acre (30 hdu/ha). In 2005, estimated pellet group data was 46 elk, 5 deer, 4 cow, and 8 horse days use/acre (114 edu/ha, 13 ddu/ha, 9cdu/ha, and 20 hdu/ha). Sage grouse were observed on the site in 2005.

Soil is moderately deep (the deepest of all 11B sites), but quite variable as evidenced by the presence of both black sagebrush and mountain big sagebrush. Average effective rooting depth is estimated at just over 17 inches. It is deeper along the first 200 feet of the baseline then becomes more shallow and rocky. Serviceberry and mountain mahogany dominate on the deeper soil, while black and mountain big sagebrush are much more numerous on the more shallow soil. A few stunted mahogany and serviceberry are found on the more shallow soil. Parent material is sandstone. Soil texture is a loam with neutral soil reaction (pH of 7.0). Phosphorus was measured at only 3.5 ppm, where values less than 6 ppm may limit normal plant growth and development in wildland soils (Tiedemann and Lopez 2004). There is little rock on the surface except for some gravel and large flat rocks predominately at the end of the baseline. There is little sign of erosion with a very high cover value for vegetation with excellent litter cover. Over 40% of the cover is made up of herbaceous plants, which protect the soils from erosion caused by high intensity summer storms. The erosion condition class determined soil movement as stable in 2005.

The browse composition has been good with 9 species sampled in 1994, 2000, and 2005. Serviceberry, bitterbrush, mountain big sagebrush, and true mountain mahogany provide a combined 18% cover in 1994, 25% in 2000, and 31% in 2005. All four species showed light to moderate use, stable densities, low decadence, and generally good vigor, although use increased to moderate in 2005. Poor vigor on serviceberry in 2000 was the result of very dry conditions which caused leaves to yellow and drop off prematurely, but were healthy in 2005. Leader growth in 2000 averaged about 10 inches for serviceberry, 13 inches for mahogany and 4 inches for mountain big sagebrush. In 2005, the leader growth for mountain big sagebrush was 2.5 inches.

Black sagebrush is found in areas with more shallow soil and it appears to be hybridizing with the mountain big sagebrush. Other common understory shrubs include: dwarf and stickyleaf low rabbitbrush, snowberry, and broom snakeweed. There are also a few bitterbrush on the site which are only lightly browsed.

The herbaceous understory composition is excellent with 44 species encountered in 1994, 37 in 2000, and 43 in 2005. Nine species of grasses were found, but only three, bluebunch wheatgrass, needle-and-thread grass, and Salina wildrye, are abundant. Bluebunch and Salina combined provided 11% cover in 2000. In 2005, bluebunch and needle-and-thread provided 12% cover. Forbs are diverse and provide nearly as much cover as grasses. Total forb cover was higher in 1994, but due to the extremely dry conditions in 2000, forb cover declined from 11% to 8%. By 2005, forb cover had recovered to nearly 11% again. Common forbs include bastard toad flax, sulfur eriogonum, and desert phlox which provided nearly 2% in 2000, but had declined to less than one-quarter of 1% in 2005. No use was apparent on any of the grasses or forbs during the 2000 and 2005 readings.

1994 APPARENT TREND ASSESSMENT

Even with the moderately high percent of bare ground (21%), with the high amounts of both litter cover and vegetation cover, trend for this site appears stable. Trend for the browse species also appears stable with high cover values, good diversity, excellent health, and vigor for all key species. The herbaceous understory is diverse, abundant, and in good condition. The Desirable Components Index score is good due to excellent browse cover, low browse decadence, and good browse recruitment.

winter range condition (DC Index) - Good (82) Higher Potential scale

2000 TREND ASSESSMENT

Trend for soil is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground increased from 2.8:1 to 3.6:1 and relative cover of bare ground decreased from 19% to 13%. Nested frequency of vegetation and litter declined slightly but cover of both increased. In addition, herbaceous cover increased slightly compared to 1994. Trend for the key browse species, serviceberry, mountain big sagebrush, and true mountain mahogany, is stable. Use on these shrubs is light to moderate, vigor is good, and decadence low. The populations have remained at similar densities compared to 1994. Trend for the herbaceous understory is down. Even though cover of grasses increased since 1994 (9% to 13%), sum of nested frequency declined. Both perennial grasses and perennial forbs decreased substantially in nested frequencies. Due to the extremely dry conditions, cover and nested frequency of forbs declined. This trend should reverse itself with a return to normal precipitation patterns. The DCI score is excellent due to excellent browse cover, low browse decadence, good browse recruitment, and good perennial grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - down (-2)

winter range condition (DC Index) - Excellent (91) Higher Potential scale

2005 TREND ASSESSMENT

The trend for soil is stable. The ratio of protective ground cover (vegetation, litter and cryptogams) to bare ground remained unchanged from 2000 to 2005. The trend for browse is slightly down. The trend for two of the key browse species on the site, serviceberry and true mountain mahogany, remained stable. The trend for the other key browse species mountain big sagebrush is down. Big sagebrush density decreased from 6,380 to 4,740 plants/acre, the majority of which were mature individuals. Utilization increased from light to moderate. Although the serviceberry and mahogany remained stable and are preferred over sagebrush, the sagebrush remains the most essential browse component after the mahogany and serviceberry lose their leaves in mid-winter. The sagebrush then becomes the key browse for the remaining winter months. The herbaceous understory trend is slightly up. The frequency of both perennial grasses and perennial forbs increased 11% and 18% from 2000 to 2005, respectively. No annual grasses were sampled on the site and annual forbs were minimal. The DCI score remained excellent with increased perennial grass cover and recruitment of young individuals.

TREND ASSESSMENT

soil - stable (0)

browse - slightly down (-1)

herbaceous understory - slightly up (+1)

winter range condition (DC Index) - Excellent (97) Higher Potential scale

HERBACEOUS TRENDS --
Management unit 11B, Study no: 15

T y p e	Species	Nested Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
G	<i>Agropyron spicatum</i>	_a 159	_{ab} 178	_b 232	1.77	6.01	9.63
G	<i>Bromus carinatus</i>	-	-	5	-	-	.04
G	<i>Carex</i> sp.	9	5	15	.02	.15	.40
G	<i>Elymus salina</i>	_b 142	_b 128	_a 5	4.34	4.93	.03
G	<i>Koeleria cristata</i>	_b 24	_a 2	_b 20	.19	.06	.39
G	<i>Oryzopsis hymenoides</i>	_{ab} 7	_a -	_b 15	.07	-	.41
G	<i>Poa fendleriana</i>	62	58	48	1.33	.77	.80
G	<i>Sitanion hystrix</i>	_b 26	_a 3	_b 39	.26	.04	.62
G	<i>Stipa columbiana</i>	_b 23	_b 15	_a -	.57	.40	.03
G	<i>Stipa comata</i>	_a -	_a -	_b 61	-	-	2.15
G	<i>Stipa lettermani</i>	_b 57	_a 16	_a 10	.74	.65	.36
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		509	405	450	9.32	13.03	14.88
Total for Grasses		509	405	450	9.32	13.03	14.88
F	<i>Androsace septentrionalis</i> (a)	4	5	14	.01	.00	.02
F	<i>Arabis</i> sp.	3	1	6	.00	.00	.01
F	<i>Arenaria fendleri</i>	9	5	2	.06	.04	.06
F	<i>Astragalus convallarius</i>	_b 18	_a 1	_a 2	.07	.00	.03
F	<i>Astragalus miser</i>	1	-	3	.00	-	.00
F	<i>Aster</i> sp.	_b 24	_a 8	_a 2	.18	.04	.00
F	<i>Astragalus</i> sp.	_b 11	_a 2	_{ab} 4	.03	.03	.01
F	<i>Balsamorhiza sagittata</i>	-	-	5	-	.03	.07
F	<i>Castilleja flava</i>	_b 36	_a 11	_{ab} 22	.15	.05	.34
F	<i>Chaenactis douglasii</i>	_b 15	_a -	_a -	.04	-	-
F	<i>Chenopodium fremontii</i> (a)	9	-	-	.04	-	-
F	<i>Chenopodium leptophyllum</i> (a)	_a 5	_a -	_b 18	.01	-	.03
F	<i>Comandra pallida</i>	_b 150	_c 201	_a 118	2.10	3.40	2.03
F	<i>Collinsia parviflora</i> (a)	_c 65	_b 10	_a -	.38	.08	-
F	<i>Crepis acuminata</i>	_a -	_a 3	_b 76	-	.03	.91
F	<i>Cryptantha</i> sp.	-	1	-	-	.00	-
F	<i>Eriogonum alatum</i>	-	-	11	-	-	.07
F	<i>Erigeron eatonii</i>	_b 110	_a 23	_a 22	.44	.13	.30
F	<i>Erigeron flagellaris</i>	16	14	4	.18	.08	.03
F	<i>Eriogonum racemosum</i>	_b 54	_a 9	_a 2	1.12	.07	.06
F	<i>Eriogonum umbellatum</i>	150	115	154	2.83	1.30	2.17

Type	Species	Nested Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
		F	<i>Hymenoxys acaulis</i>	-	1	6	-
F	<i>Hymenoxys richardsonii</i>	5	-	-	.06	-	-
F	<i>Ipomopsis aggregata</i>	15	2	13	.07	.01	.03
F	<i>Linum lewisii</i>	_b 30	_a -	_b 10	.06	-	.02
F	<i>Lithospermum</i> sp.	_a 16	_a 8	_b 40	.32	.18	1.21
F	<i>Machaeranthera canescens</i>	_b 12	_a -	_a 2	.08	-	.03
F	<i>Machaeranthera grindelioides</i>	_b 30	_a 2	_a 6	.18	.03	.03
F	<i>Microsteris gracilis</i> (a)	-	-	-	-	-	-
F	<i>Oenothera</i> sp.	_c 33	_a -	_b 17	.36	-	.66
F	<i>Penstemon caespitosus</i>	_b 90	_a 38	_a 34	.91	.15	.39
F	<i>Penstemon palmeri</i>	3	-	4	.01	-	.03
F	<i>Petrorhiza pumila</i>	-	-	2	-	-	.03
F	<i>Penstemon watsonii</i>	29	22	33	.25	.70	1.11
F	<i>Phlox austromontana</i>	_b 50	_b 58	_a 19	1.11	1.65	.13
F	<i>Phlox longifolia</i>	_b 58	_a 27	_{ab} 35	.11	.21	.21
F	<i>Polygonum douglasii</i> (a)	_b 41	_a -	_c 99	.07	-	.34
F	<i>Taraxacum officinale</i>	4	8	4	.03	.04	.06
Total for Annual Forbs		124	15	131	0.51	0.08	0.40
Total for Perennial Forbs		972	560	658	10.82	8.26	10.14
Total for Forbs		1096	575	789	11.33	8.35	10.54

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

BROWSE TRENDS --

Management unit 11B, Study no: 15

Type	Species	Strip Frequency			Average Cover %		
		'94	'00	'05	'94	'00	'05
B	Amelanchier utahensis	25	35	38	4.98	7.68	9.42
B	Artemisia frigida	1	0	0	-	-	-
B	Artemisia nova	23	24	15	1.37	.73	.42
B	Artemisia tridentata vaseyana	71	68	64	6.51	10.85	13.11
B	Cercocarpus montanus	41	41	42	6.06	6.55	7.96
B	Chrysothamnus depressus	16	20	21	.80	.19	.91
B	Chrysothamnus viscidiflorus viscidiflorus	84	47	50	1.26	.67	1.43
B	Gutierrezia sarothrae	27	14	19	.48	.12	.21
B	Opuntia sp.	2	1	2	-	-	-
B	Purshia tridentata	2	2	5	-	.38	.78
B	Symphoricarpos oreophilus	52	45	39	2.41	2.78	3.74
B	Tetradymia canescens	2	0	0	.03	-	-
Total for Browse		346	297	295	23.93	30.00	38.00

CANOPY COVER, LINE INTERCEPT --

Management unit 11B, Study no: 15

Species	Percent Cover
	'05
Amelanchier utahensis	13.58
Artemisia nova	.76
Artemisia tridentata vaseyana	15.18
Cercocarpus montanus	9.96
Chrysothamnus depressus	.46
Chrysothamnus viscidiflorus viscidiflorus	1.33
Gutierrezia sarothrae	.30
Purshia tridentata	.41
Symphoricarpos oreophilus	5.15

KEY BROWSE ANNUAL LEADER GROWTH --
 Management unit 11B, Study no: 15

Species	Average leader growth (in)
	'05
Artemisia tridentata vaseyana	2.5
Cercocarpus montanus	4.3

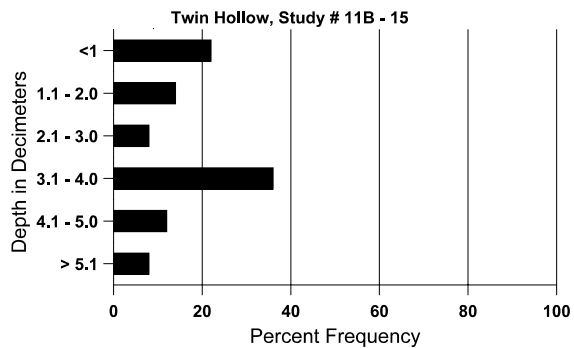
BASIC COVER --
 Management unit 11B, Study no: 15

Cover Type	Average Cover %		
	'94	'00	'05
Vegetation	42.89	48.85	54.02
Rock	2.13	1.44	2.12
Pavement	.41	2.82	2.56
Litter	44.90	62.65	43.07
Cryptogams	.00	0	0
Bare Ground	21.18	17.28	15.23

SOIL ANALYSIS DATA --
 Herd Unit 11B, Study # 15, Study Name: Twin Hollow

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
17.1	61.8 (17.0)	7.0	44.0	31.4	24.6	4.6	3.5	291.2	0.7

Stoniness Index



PELLET GROUP DATA --
 Management unit 11B, Study no: 15

Type	Quadrat Frequency		
	'94	'00	'05
Rabbit	5	1	5
Moose	-	-	1
Horse	4	4	5
Elk	11	13	20
Deer	5	5	13
Cattle	-	-	1

Days use per acre (ha)	
'00	'05
-	-
-	-
9 (23)	8 (20)
69 (169)	46 (114)
5 (12)	5 (13)
-	4 (9)

BROWSE CHARACTERISTICS --
 Management unit 11B, Study no: 15

		Age class distribution (plants per acre)					Utilization					
Y	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Amelanchier utahensis</i>												
94	1180	20	60	1100	20	20	10	0	2	-	0	42/49
00	1160	60	200	940	20	20	34	0	2	2	50	44/51
05	1000	-	280	700	20	-	24	40	2	-	0	46/56
<i>Artemisia frigida</i>												
94	20	-	-	20	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Artemisia nova</i>												
94	820	20	180	620	20	80	15	0	2	-	0	11/13
00	1180	-	80	1100	-	40	2	0	0	-	0	10/14
05	600	140	40	540	20	160	10	0	3	-	0	10/13
<i>Artemisia tridentata vaseyana</i>												
94	7300	80	720	6340	240	180	3	.82	3	1	1	16/17
00	6380	80	620	5140	620	220	11	0	10	1	2	16/22
05	4740	60	200	4040	500	380	22	23	11	3	3	21/27
<i>Cercocarpus montanus</i>												
94	2540	340	1280	1000	260	40	24	0	10	8	8	44/48
00	2520	3560	1440	1020	60	-	32	2	2	.79	2	46/47
05	2440	980	1720	620	100	40	44	28	4	2	2	53/56
<i>Chrysothamnus depressus</i>												
94	1700	-	60	1640	-	20	0	0	0	-	0	5/6
00	1300	-	-	1260	40	-	2	0	3	3	3	3/5
05	1120	-	40	1060	20	-	27	11	2	2	2	5/8

		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)
Chrysothamnus viscidiflorus viscidiflorus												
94	5560	-	320	5220	20	-	0	0	0	-	0	8/7
00	1580	-	-	1500	80	-	0	0	5	5	5	11/10
05	2140	-	440	1700	-	-	9	.93	0	-	0	12/10
Gutierrezia sarothrae												
94	1340	-	160	1180	-	-	0	0	0	-	0	6/5
00	780	-	-	780	-	-	0	0	0	-	0	4/4
05	640	40	60	560	20	-	0	0	3	-	0	9/8
Opuntia sp.												
94	40	-	20	20	-	-	0	0	0	-	0	2/11
00	20	-	-	-	20	-	0	0	100	-	0	-/-
05	60	-	-	60	-	-	0	0	0	-	0	4/8
Purshia tridentata												
94	40	-	20	20	-	-	0	0	-	-	0	-/-
00	40	-	-	40	-	-	0	0	-	-	0	18/40
05	100	-	40	60	-	-	60	0	-	-	0	19/28
Symphoricarpos oreophilus												
94	2420	-	160	2240	20	-	3	0	1	-	2	12/19
00	1560	-	240	1240	80	-	0	0	5	5	8	10/18
05	1440	-	240	1200	-	-	0	0	0	-	0	13/22
Tetradymia canescens												
94	40	-	-	40	-	-	0	0	-	-	0	7/7
00	0	-	-	-	-	-	0	0	-	-	0	6/10
05	0	-	-	-	-	-	0	0	-	-	0	14/11