

Trend Study 24-9-03

Study site name: Mud Spring.

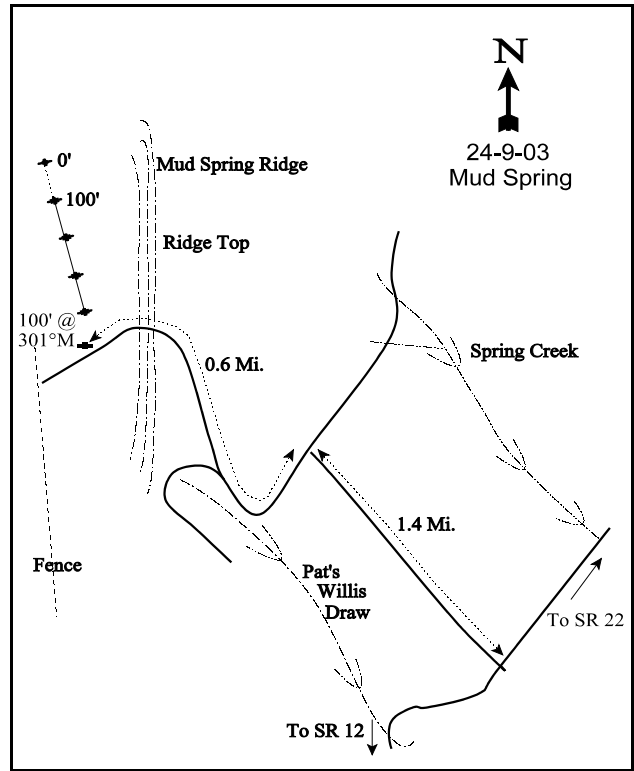
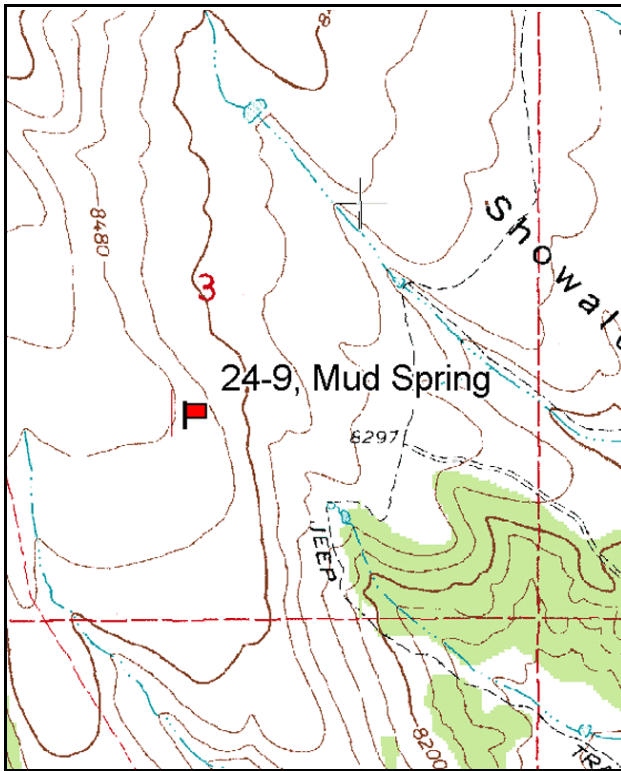
Vegetation type: Black Sagebrush.

Compass bearing: frequency baseline 167 degrees magnetic.

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

LOCATION DESCRIPTION

From SR 22, about 1^{1/2} miles south of Widstoe Junction, turn west onto the road leading to Tom Best Spring and Highway 12. Proceed 4.2 miles to the U.S. Forest Service boundary. Continue on the main road for 5.3 miles to an intersection at Showalter Creek. Continue on the main road 1 mile to a faint road on the right. Turn and go up towards Mud Spring Ridge 1.4 miles to a T-intersection. Turn left and go 0.6 miles up a faint, rough road to the top of the ridge and a witness post identifying the study area. The 400 foot stake is 100 feet northwest of the witness post. The start of the transect is actually 400 feet north, and runs back south towards the road. Study markers are 1-foot tall fence posts.



Map Name: Flake Mountain West

Diagrammatic Sketch

Township 35S, Range 4W, Section 3

GPS: NAD 27, UTM 12S 4182640 N, 393177 E

DISCUSSION

Mud Spring - Trend Study 24-9

The Mud Spring study site is located on a gently sloping (3-5%) sagebrush covered bench. Site aspect is to the southeast at an elevation of 8,480 feet. Spring Creek is east of the site and Pat Willis Draw lies to the southeast. The southern aspect, coupled with sufficient wind, limits snow depth on this area during much of the winter. Black sagebrush is the dominant shrub on this site and a variety of grasses and forbs occupy the understory. This is a key wintering area for elk. Several deer were seen near the site in 1997 and there was evidence that moderately high numbers of deer and elk have been using the site. Quadrat frequency of deer pellet groups was 22% in 1997 while elk numbered 34%. Cattle also use the area and were seen in the vicinity by a stock pond in 1997. Pellet group data from 2003 estimated 32 elk and 32 deer days use/acre (79 edu/ha and 79 ddu/ha). Cattle had used the site during the spring of 2003, estimated at 16 days use/acre (39 cdu/ha).

Soil depth is moderately shallow, as evidenced by the predominance of the shallow rooted black sagebrush. Effective rooting depth is estimated at almost 12 inches. Soil texture at the site is a sandy clay loam which is slightly acidic (pH 6.1). Rocks are common on the surface and throughout the profile. They are generally less than three inches in diameter. Erosion pavement is present on the soil surface, indicating some sheet erosion has taken place over time. Many plants are pedestalled, but overall, the erosion potential on this site is currently low, given the rocky soil and gentle slope. Ground cover appears adequate to limit surface runoff and to promote infiltration.

The key shrub species is black sagebrush. There is also some isolated patches of mountain big sagebrush on the site where the soils are invariably deeper. Black sagebrush accounted for 63% of the browse cover in 1997, increasing to 72% in 2003 with average cover values of 12% and 21% respectively. The population is dense and dynamic. Density has fluctuated from a high of 22,733 plants/acre in 1991 to nearly 10,000 plants/acre in 1997. Density was estimated at 18,820 plants/acre in 2003. Use of the low growing sagebrush has been mostly light since 1987. Vigor has remained good on most plants during all years and percent decadence low. Young recruitment has been excellent during each reading.

The site also supports several other shrubs which offer additional browse forage including mountain big sagebrush, dwarf rabbitbrush, rubber rabbitbrush, Parry rabbitbrush, and small numbers of bitterbrush. All of these species have increased in density since 1997. The small populations of mountain big sagebrush and bitterbrush were moderately hedged in 2003. The increaser, stickyleaf low rabbitbrush, also occurs on the site in moderate numbers.

The herbaceous understory is diverse and fairly abundant for a black sagebrush site. Seven perennial grasses and one sedge combined to produce over 13% cover in 1997 and 2003. The most common grasses include mutton bluegrass, Letterman needlegrass, and a Carex. The forb composition is also diverse and productive. Twenty-seven forbs were identified in 1997 and 22 species were found in 2003. Common species include rose pussytoes, Eaton fleabane, redroot and sulfur eriogonum, silvery lupine, and lobeleaf groundsel.

1991 TREND ASSESSMENT

Most basic cover parameters are almost unchanged since 1987, but two of the more important have changed. Litter cover has declined from 54% to 46% while bare ground has increased from 19% to 29%. This would indicate a slightly downward trend, making the soil more susceptible to erosion with late summer high intensity storms. Trend for the browse component of the community would be up, because the key species, black sagebrush, has almost doubled it's population with only a slight increase in percent decadency. Because of the high diversity for both forbs and grasses on the site and that on average, about half increased and the

other half decreased in quadrat frequency, the trend appears stable at this time.

TREND ASSESSMENT

soil - slightly downward (2)

browse - upward (5)

herbaceous understory - stable (3)

1997 TREND ASSESSMENT

Trend for soil appears stable. Percent bare ground declined slightly but litter cover also continued to decline. Trend for the key browse species, black sagebrush, is down slightly. Density has declined 56% since 1991, and there has been an obvious substantial reduction in density from all age classes. The lack of large numbers of dead plants suggests that some of the change in density, of mature and decadent plants, is due to the much larger sample size used in 1997. The current population of 9,920 plants/acre is at a more sustainable level. However, the percentage of decadent plants classified as dying has continued to increase since 1987, with it being at a high of 63% at this time. There has also been a decline in the densities of rabbitbrush and prickly phlox, two less desirable increaser shrubs. Trend for the herbaceous understory appears to be stable. Sum of nested frequency for grasses has remained similar since 1991.

TREND ASSESSMENT

soil - stable (3)

browse - down slightly (2)

herbaceous understory - stable (3)

2003 TREND ASSESSMENT

Trend for soil is stable due to similar ground cover characteristics compared to 1997. There is adequate protective ground cover to prevent most erosion. The gentle terrain also limits soil loss. Trend for browse is up. The key species, black sagebrush, has doubled in density from 9,920 to 18,820 plants/acre. Use is mostly light, vigor good, and percent decadence low. Young recruitment is good. However, density is higher than what would be preferred and cover has nearly doubled from 12% in 1997 to 21% in 2003. Other preferred shrubs occur in smaller numbers but have also increased in density. Trend for the herbaceous understory is mixed. Trend for perennial grasses is basically stable. Sum of nested frequency of perennial grasses has declined slightly with each reading since 1991, but nested frequency has only declined 4% since 1997. Nested frequency of Carex declined significantly while frequency of mutton bluegrass increased significantly. Some of the increase in mutton bluegrass is likely due to identification problems with Sandberg bluegrass. Cover of perennial grasses has also remained stable since 1997 at about 13.5%. Sum of nested frequency of perennial forbs has declined more significantly with each reading since 1987, and sum of nested frequency fell 20% since 1997. Cover of forbs has declined slightly from 7% in 1997 to 5% in 2003. Total sum of nested frequency of perennial grasses and forbs has declined 12% since 1997. With this in mind, trend for the herbaceous understory is considered down slightly.

TREND ASSESSMENT

soil - stable (3)

browse - up (5)

herbaceous understory - down slightly (2)

HERBACEOUS TRENDS --
Management unit 24 , Study no: 9

Type	Species	Nested Frequency				Average Cover %	
		'87	'91	'97	'03	'97	'03
G	Agropyron smithii	3	7	6	7	.18	.04
G	Agropyron trachycaulum	-	-	7	-	.16	-
G	Bouteloua gracilis	29	23	20	22	.15	.27
G	Carex spp.	a62	b102	ab79	a58	2.15	1.22
G	Poa fendleriana	a-	a-	b158	c248	3.26	7.83
G	Poa secunda	c211	c218	b44	a-	1.27	-
G	Sitanion hystrix	b102	a65	a33	a34	.21	.19
G	Stipa columbiana	-	-	-	5	-	.03
G	Stipa comata	51	34	43	28	.86	.32
G	Stipa lettermani	a146	ab179	b219	ab181	5.17	3.73
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		604	628	609	583	13.44	13.65
Total for Grasses		604	628	609	583	13.44	13.65
F	Antennaria rosea	a14	ab16	bc42	c45	1.27	.74
F	Arabis spp.	b20	a3	a1	a-	.00	-
F	Astragalus humistratus	c151	b14	a-	a-	-	-
F	Astragalus newberryi	-	4	-	-	-	-
F	Aster spp.	-	-	3	1	.00	.00
F	Astragalus spp.	a-	b29	c96	a3	.73	.03
F	Balsamorhiza ssp.	-	3	-	-	-	-
F	Castilleja linariaefolia	b42	a1	a3	a8	.02	.01
F	Chaenactis douglasii	4	-	4	-	.00	-
F	Cirsium spp.	b46	ab35	a23	a18	.37	.35
F	Crepis acuminata	a-	ab7	a-	b9	-	.07
F	Cryptantha spp.	-	3	1	-	.03	-
F	Erigeron eatonii	c246	b215	a31	a29	.20	.19
F	Erigeron flagellaris	-	-	-	1	-	.00
F	Erigeron pumilus	a-	a-	b16	b29	.06	.30
F	Eriogonum racemosum	b223	b214	ab185	a172	1.45	1.68
F	Eriogonum umbellatum	75	80	57	47	.56	.70
F	Galium boreale	-	-	5	-	.01	-
F	Gayophytum ramosissimum(a)	-	-	-	7	-	.01
F	Hymenoxys acaulis	-	-	6	-	.04	-
F	Hymenopappus filifolius	-	4	-	2	-	.03

T y p e	Species	Nested Frequency				Average Cover %	
		'87	'91	'97	'03	'97	'03
F	<i>Linum lewisii</i>	-	-	1	-	.03	-
F	<i>Lotus utahensis</i>	_b 24	_{ab} 14	_a 1	_b 22	.00	.12
F	<i>Lupinus pusillus</i> (a)	3	-	-	-	-	-
F	<i>Lupinus sericeus</i>	_b 65	_a 38	_{ab} 51	_a 27	1.33	.29
F	<i>Lygodesmia spinosa</i>	10	14	16	5	.10	.19
F	<i>Microsteris gracilis</i> (a)	-	-	2	-	.00	-
F	<i>Orthocarpus</i> spp. (a)	-	-	_a 2	_b 19	.01	.10
F	<i>Penstemon comarrhenus</i>	_b 16	_a 4	_a 5	_a -	.01	-
F	<i>Phlox longifolia</i>	_a -	_a -	_b 19	_{ab} 10	.04	.02
F	<i>Potentilla diversifolia</i>	7	2	10	9	.22	.07
F	<i>Polygonum douglasii</i> (a)	-	-	_b 23	_a -	.05	-
F	<i>Senecio integerrimus</i>	-	-	-	3	-	.00
F	<i>Senecio multilobatus</i>	_b 71	_a 4	_a 21	_b 47	.18	.35
F	<i>Sphaeralcea coccinea</i>	_a -	_a -	_b 11	_a 4	.04	.04
F	<i>Taraxacum officinale</i>	-	2	3	-	.00	-
Total for Annual Forbs		3	0	27	26	0.06	0.11
Total for Perennial Forbs		1014	706	611	491	6.76	5.25
Total for Forbs		1017	706	638	517	6.82	5.37

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

BROWSE TRENDS --

Management unit 24 , Study no: 9

Type	Species	Strip Frequency		Average Cover %	
		'97	'03	'97	'03
B	<i>Artemisia nova</i>	78	100	12.12	21.05
B	<i>Artemisia tridentata vaseyana</i>	13	17	1.64	1.72
B	<i>Chrysothamnus depressus</i>	45	35	3.40	2.66
B	<i>Chrysothamnus nauseosus hololeucus</i>	6	19	.01	.95
B	<i>Chrysothamnus parryi</i>	2	38	.03	.40
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	28	45	1.90	1.97
B	<i>Gutierrezia sarothrae</i>	1	0	-	-
B	<i>Leptodactylon pungens</i>	12	22	.02	.43
B	<i>Purshia tridentata</i>	0	4	-	.03
B	<i>Symphoricarpos oreophilus</i>	1	1	.00	-
B	<i>Tetradymia canescens</i>	1	3	-	.15
Total for Browse		187	284	19.15	29.37

CANOPY COVER, LINE INTERCEPT --

Management unit 24 , Study no: 9

Species	Percent Cover
	'03
<i>Artemisia nova</i>	18.03
<i>Artemisia tridentata vaseyana</i>	1.45
<i>Chrysothamnus depressus</i>	1.10
<i>Chrysothamnus nauseosus hololeucus</i>	1.04
<i>Chrysothamnus parryi</i>	.05
<i>Chrysothamnus viscidiflorus viscidiflorus</i>	.96
<i>Leptodactylon pungens</i>	.11
<i>Purshia tridentata</i>	.10
<i>Symphoricarpos oreophilus</i>	.26

KEY BROWSE ANNUAL LEADER GROWTH --
 Management unit 24 , Study no: 9

Species	Average leader growth (in)
	'03
Artemisia nova	1.1
Artemisia tridentata vaseyana	1.6
Purshia tridentata	2.5

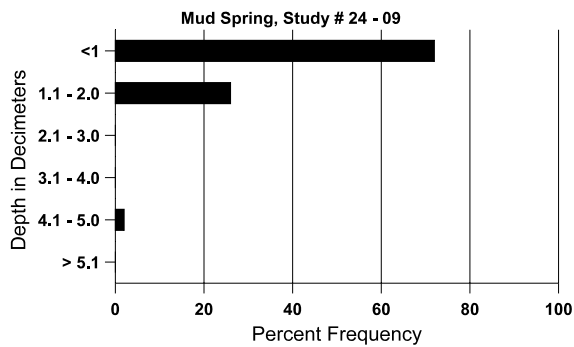
BASIC COVER --
 Management unit 24 , Study no: 9

Cover Type	Average Cover %			
	'87	'91	'97	'03
Vegetation	10.75	10.50	29.07	46.79
Rock	8.00	9.25	8.10	10.64
Pavement	8.25	4.75	6.79	5.69
Litter	53.75	46.25	30.77	28.35
Cryptogams	0	.25	.13	.13
Bare Ground	19.25	29.00	22.82	25.11

SOIL ANALYSIS DATA --
 Management unit 24, Study no: 9, Study Name: Mud Spring

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	dS/m
11.6	62.3 (10.4)	6.1	48.7	25.4	25.8	2.7	11.9	275.2	0.5

Stoniness Index



PELLET GROUP DATA --
 Management unit 24 , Study no: 9

Type	Quadrat Frequency		Days use per acre (ha)
	'97	'03	
Rabbit	8	20	-
Grouse	-	2	-
Elk	34	14	32 (79)
Deer	22	10	32 (79)
Cattle	8	5	16 (39)

BROWSE CHARACTERISTICS --
 Management unit 24 , Study no: 9

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
<i>Artemisia nova</i>											
87	12065	2400	3666	7266	1133	-	18	.55	9	11	11/13
91	22733	17400	7800	10533	4400	-	16	.58	19	3	13/14
97	9920	480	1440	6840	1640	680	4	0	17	11	12/19
03	18820	80	2280	14040	2500	520	3	0	13	4	13/18
<i>Artemisia tridentata vaseyana</i>											
87	0	-	-	-	-	-	0	0	0	0	-/-
91	66	-	-	66	-	-	0	0	0	0	10/11
97	340	80	-	220	120	60	18	0	35	6	24/34
03	460	-	20	360	80	60	61	0	17	4	26/36
<i>Chrysothamnus depressus</i>											
87	0	-	-	-	-	-	0	0	-	0	-/-
91	0	-	-	-	-	-	0	0	-	0	-/-
97	3040	20	580	2460	-	-	0	0	-	0	5/8
03	3980	-	-	3980	-	-	0	0	-	0	4/7
<i>Chrysothamnus nauseosus hololeucus</i>											
87	0	-	-	-	-	-	0	0	0	0	-/-
91	999	-	333	266	400	-	20	53	40	0	5/6
97	180	-	100	80	-	-	0	0	0	0	7/10
03	1280	-	-	1220	60	-	8	0	5	2	6/10

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Chrysothamnus parryi											
87	0	-	-	-	-	-	0	0	-	0	-/-
91	0	-	-	-	-	-	0	0	-	0	-/-
97	80	-	20	60	-	-	0	0	-	0	9/10
03	1480	-	20	1460	-	-	18	26	-	0	6/8
Chrysothamnus viscidiflorus viscidiflorus											
87	9333	266	3000	6133	200	-	0	.71	2	6	4/6
91	14666	800	3733	9933	1000	-	7	43	7	2	5/8
97	1880	-	-	1860	20	-	2	0	1	1	14/23
03	2960	-	80	2780	100	-	0	0	3	1	7/10
Gutierrezia sarothrae											
87	66	-	-	66	-	-	0	0	-	0	5/3
91	0	-	-	-	-	-	0	0	-	0	-/-
97	20	-	-	20	-	-	0	0	-	0	6/6
03	0	-	-	-	-	-	0	0	-	0	-/-
Leptodactylon pungens											
87	2266	-	266	2000	-	-	0	0	0	0	5/3
91	8265	133	4133	4066	66	-	.80	0	1	2	4/5
97	460	20	-	440	20	-	0	0	4	4	6/7
03	880	-	-	780	100	-	0	0	11	5	6/7
Opuntia spp.											
87	66	-	-	66	-	-	0	0	-	0	5/4
91	0	-	-	-	-	-	0	0	-	0	-/-
97	0	-	-	-	-	-	0	0	-	0	2/5
03	0	-	-	-	-	-	0	0	-	0	-/-
Purshia tridentata											
87	0	-	-	-	-	-	0	0	0	0	-/-
91	0	-	-	-	-	-	0	0	0	0	-/-
97	0	-	-	-	-	-	0	0	0	0	-/-
03	100	-	-	80	20	-	0	100	20	20	10/22
Symphoricarpos oreophilus											
87	0	-	-	-	-	-	0	0	-	0	-/-
91	0	-	-	-	-	-	0	0	-	0	-/-
97	20	-	-	20	-	-	100	0	-	0	12/30
03	40	-	-	40	-	-	0	0	-	0	10/24

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
<i>Tetradymia canescens</i>											
87	199	-	133	66	-	-	33	0	-	0	8/6
91	200	-	200	-	-	-	0	0	-	0	-/-
97	20	-	20	-	-	-	0	0	-	0	-/-
03	80	-	-	80	-	-	0	0	-	0	7/9