

Trend Study 10R-22-05

Study site name: Rathole Ridge.

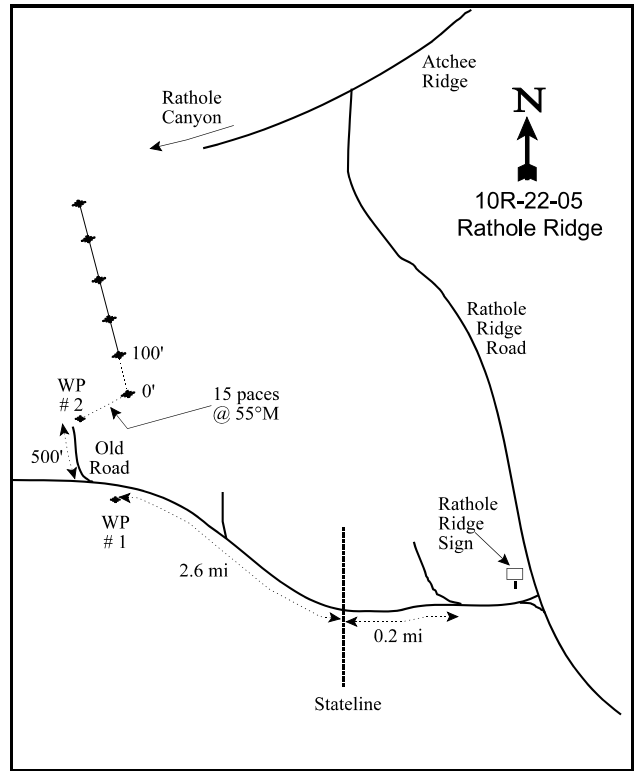
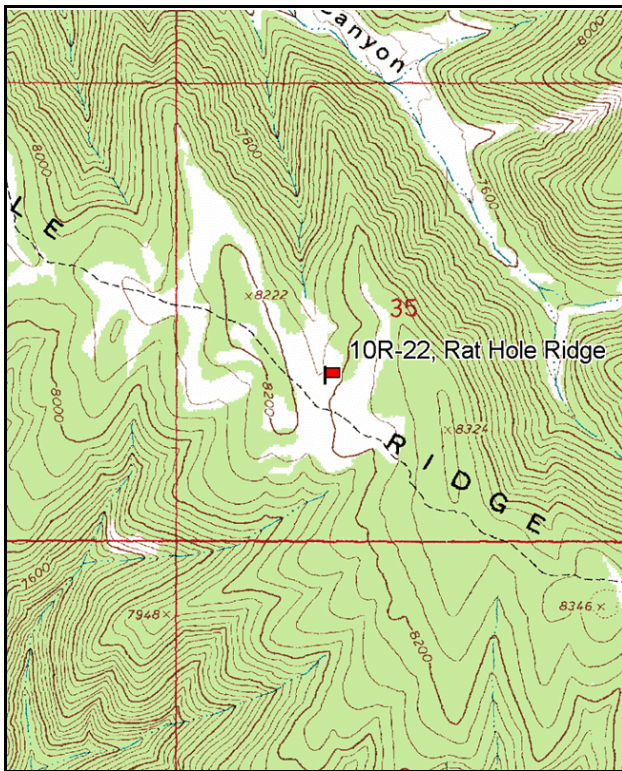
Vegetation Type: Mountain big sagebrush.

Compass bearing: frequency baseline 336 degrees magnetic.

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

LOCATION DESCRIPTION

From the Junction of Atchee Ridge Road, Rathole Canyon and Rathole Ridge Road follow Rathole Ridge Road up to the a sign pointing to Rathole Ridge. Take this road to the first fork. Take a left at the fork and continue down the canyon 0.2 miles to the state line. Continue 2.6 miles down (staying left) to a witness post on the left side of the road. Just past the witness post an old road breaks off to the right follow it about 500' to another witness post on the right side of the road. From this second witness post the 0' stake is 15 paces at 55°M and is marked with browse tag #111.



Map name: Rathole Ridge

Diagrammatic Sketch

Township 14S, Range 25E, Section 35.

GPS: NAD 27, UTM 12S 4379806 N, 664253 E

DISCUSSION

Rathole Ridge - Trend Study No. 10R-22

The Rathole Ridge study was established in 1998 to monitor perceived conflicts over elk and livestock use in the North Bookcliffs. This site has a northwest aspect with a slope of 3-6% at 8,200 feet in elevation. This sagebrush flat on top of the ridge was burned in a prescribed fire in the fall of 1998 to reduce sagebrush cover and increase herbaceous vegetation. This area is within the Atchee Ridge allotment which permits cattle grazing from June through September on a deferred rest rotation basis. Estimated pellet group transect data in 1998 was one deer days use/acre (2 ddu/ha), 27 elk days use/acre (67 edu/ha), and eight cow days use/acre (20 cdu/ha). Pellet group transect data estimates in 2000 showed similar levels of use with two deer days/acre (5 ddu/ha), 33 elk days use/acre (82 edu/ha), and one cow days use/acre (2 cdu/ha). Utilization was higher in 2005 with an estimated 56 elk, 16 deer, and 14 cow (137 edu/ha, 40 ddu/ha, and 34 cdu/ha).

Soils are loamy in texture and soil reaction is slightly acidic (pH of 6.3). With very little rock actually sampled within the profile, the stoniness index is more a measure of compaction than rockiness. Soil depth is moderately shallow with an estimated effective rooting depth of just over 12 inches. Vegetation and litter were abundant in 1998 and after the fire the high amount of herbaceous cover is excellent at protecting the soil from erosion. The erosion state was classified as stable in 2005.

In 1998, browse was abundant and contributed over 25% average cover. Mountain big sagebrush was the dominant species providing 86% of the browse cover. However on summer range, browse is not the key vegetation component and the dense stand of mountain big sagebrush needed to be reduced to improve the understory and possibly other preferred browse species such as bitterbrush and serviceberry. After the fire, browse cover was reduced to only 5% in 2000, which increased to 7% in 2005. Mountain big sagebrush was greatly reduced from 21% cover before the treatment to only 2% in 2000 and 2005. Although cover of sagebrush did not increase in 2005, density increased from 540 plants/acre to 1,100 plants/acre in 2005. Recruitment of young plants was good in both 2000 and 2005. The prescribed burn was not very hot as many of the burned sagebrush skeletons were still standing when the site was read in 2000. Bitterbrush density increased to 140 plants/acre in 2000, but only 40 plants/acre were estimated in 2005. Serviceberry, a fire tolerant species, survived the fire and was vigorous in 2005. Many large serviceberry plants surround the transect on the ridge.

Herbaceous vegetation is the dominant and key component of this study. Needle-and-thread, Kentucky bluegrass, and thickspike wheatgrass are the most abundant. Other moderately abundant species include a sedge, subalpine needlegrass, mutton bluegrass, prairie junegrass, and mountain brome. After the fire, perennial grass nested frequency increased 8% in 2000 and another 20% in 2005. Production has also increased as grass cover increased from 15% to 38% in 2005. Forbs are very diverse with a good composition. Increasers are present but not dominant, with many abundant preferred forage species. The forb component is key on this site as they provide important forage for deer and elk in the spring and summer. Perennial forbs increased in sum of nested frequency by 22% in 2000, but then declined by 31% in 2005. Forb cover also declined in 2005. This may be due to drought and timing of precipitation. Some of the *Penstemon*'s were noted as utilized in 2000. In 2005, light grazing on grasses, hawksbeard, and paintbrush was noted.

1998 APPARENT TREND ASSESSMENT

Soils appear stable. There is no apparent erosion due to the gentle slope and the abundance of protective ground cover from vegetation and litter. Browse is abundant, especially mountain big sagebrush. As this is transitional/summer range, browse is not the critical component and a prescribed burn is planned to reduce sagebrush density and cover and increase herbaceous species. Herbaceous trend appears stable with a diverse understory of both perennial grasses and forbs. With the planned prescribed burn, herbaceous vegetation should increase and would become a more important component for this site.

2000 TREND ASSESSMENT

Soil trend is considered slightly down with the decrease in vegetation and litter cover decreased and relative bare ground increasing from 10% to 22%. The ratio of bare ground to protective cover was substantially reduced. Herbaceous vegetation provides nearly as much cover as before the burn and it has increased in sum of nested frequency following the burn. Trend for browse is slightly up overall as mountain big sagebrush no longer dominates the site and the more preferred species such as serviceberry and bitterbrush have resprouted and survived the fire. Trend for the herbaceous understory is slightly up as perennial species, especially forbs, increased in sum of nested frequency in 2000. Composition of the understory is good with many good forage species present.

TREND ASSESSMENT

soil - slightly down (-1)

browse - slightly up (+1)

herbaceous understory - slightly up (+1)

winter range condition (DC Index) - Not applicable, summer range

2005 TREND ASSESSMENT

The soil trend is considered stable as relative percent bare soil only decreased from 22% to 18%. The bare ground to protective ground cover (vegetation, litter, and cryptogams) ratio was almost unchanged. Herbaceous cover increased from 37% to 53% in 2005. The browse trend is stable. Mountain big sagebrush has recruited new individuals, but is not dominant as it was prior to the fire. Bitterbrush and serviceberry have also remained stable. The trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses increased 20% and grass cover increased from 15% to 38%, however sum of nested frequency of perennial forbs declined 31%. Grasses have taken a larger proportion of the total vegetation cover. Drought and timing of precipitation likely have not favored forbs. Nutrient flush immediately following the fire may have also influenced the increase of forbs in 2000.

TREND ASSESSMENT

soil - stable (0)

browse - stable (0)

herbaceous understory - stable (0)

winter range condition (DC Index) - Not applicable, summer range

HERBACEOUS TRENDS --

Management unit 10R, Study no: 22

T y p e	Species	Nested Frequency			Average Cover %		
		'98	'00	'05	'98	'00	'05
G	Agropyron dasystachyum	184	222	225	1.97	3.22	5.95
G	Bouteloua gracilis	-	1	-	-	.03	-
G	Bromus carinatus	_b 29	_a 5	_a -	.35	.06	-
G	Bromus tectorum (a)	2	-	-	.03	-	-
G	Carex sp.	_a 3	_b 54	_b 56	.03	.73	.62
G	Koeleria cristata	_b 42	_b 36	_a 13	.52	.37	.51
G	Poa fendleriana	_b 69	_{ab} 43	_a 29	1.45	.95	.72

Type	Species	Nested Frequency			Average Cover %		
		'98	'00	'05	'98	'00	'05
		G	<i>Poa nevadensis</i>	a-	b14	c115	-
G	<i>Poa pratensis</i>	a156	a162	b202	6.88	3.09	10.69
G	<i>Sitanion hystrix</i>	13	-	1	.10	-	.00
G	<i>Stipa columbiana</i>	a15	b76	b64	.30	1.12	3.84
G	<i>Stipa comata</i>	b183	a137	b193	6.68	5.70	12.82
Total for Annual Grasses		2	0	0	0.03	0	0
Total for Perennial Grasses		694	750	898	18.30	15.47	37.55
Total for Grasses		696	750	898	18.34	15.47	37.55
F	<i>Achillea millefolium</i>	18	25	10	.19	.55	.24
F	<i>Agoseris glauca</i>	a-	b41	b57	-	.22	1.15
F	<i>Alyssum alyssoides</i> (a)	-	1	-	-	.00	-
F	<i>Antennaria rosea</i>	27	21	13	.73	.55	.71
F	<i>Androsace septentrionalis</i> (a)	a11	a-	b32	.07	-	.25
F	<i>Arabis</i> sp.	8	-	-	.04	-	-
F	<i>Arenaria congesta</i>	b227	ab209	a173	3.19	4.18	2.84
F	<i>Astragalus convallarius</i>	ab13	b33	a4	.22	.27	.04
F	<i>Astragalus miser</i>	b155	b168	a79	6.25	5.81	1.19
F	<i>Aster</i> sp.	a-	c45	c17	-	.59	.25
F	<i>Castilleja flava</i>	b97	b82	a3	2.02	1.60	.00
F	<i>Calochortus nuttallii</i>	3	-	-	.03	-	.00
F	<i>Chenopodium leptophyllum</i> (a)	-	-	6	-	-	.01
F	<i>Crepis acuminata</i>	ab100	b125	a75	1.42	1.70	1.41
F	<i>Delphinium nuttallianum</i>	a4	a-	b25	.01	-	.14
F	<i>Draba</i> sp. (a)	1	1	3	.03	.00	.00
F	<i>Erigeron eatonii</i>	a12	b39	a9	.05	.18	.04
F	<i>Eriogonum</i> sp.	2	-	-	.00	-	-
F	<i>Eriogonum umbellatum</i>	b25	a8	b28	.55	.12	.56
F	<i>Gayophytum ramosissimum</i> (a)	a-	a1	b16	-	.00	.03
F	<i>Geranium richardsonii</i>	ab36	b52	a24	1.82	1.22	.76
F	<i>Hackelia patens</i>	a1	b21	ab8	.00	.09	.07
F	<i>Lupinus argenteus</i>	b28	b29	a-	1.16	1.00	-
F	<i>Penstemon caespitosus</i>	18	27	24	.37	.34	.90
F	<i>Penstemon watsonii</i>	64	58	43	1.56	.98	1.36
F	<i>Phlox longifolia</i>	a15	b46	b58	.05	.14	.26
F	<i>Polygonum douglasii</i> (a)	b44	a2	c77	.36	.00	.18
F	<i>Potentilla gracilis</i>	a-	b14	b24	-	.97	1.18

T y p e	Species	Nested Frequency			Average Cover %		
		'98	'00	'05	'98	'00	'05
		F	<i>Potentilla pennsylvanica</i>	19	27	13	.87
F	<i>Senecio integerrimus</i>	_a 5	_a	_b 19	.04	-	.59
F	<i>Taraxacum officinale</i>	15	29	22	.19	.21	.18
F	<i>Thalictrum fendleri</i>	-	1	-	-	.00	-
F	<i>Tragopogon dubius</i>	2	3	-	.00	.00	-
F	Unknown forb-perennial	-	-	30	-	-	.08
F	<i>Viguiera multiflora</i>	9	-	-	.33	-	-
Total for Annual Forbs		56	5	134	0.46	0.01	0.48
Total for Perennial Forbs		903	1103	758	21.16	21.56	14.67
Total for Forbs		959	1108	892	21.62	21.58	15.15

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

BROWSE TRENDS --

Management unit 10R, Study no: 22

T y p e	Species	Strip Frequency			Average Cover %		
		'98	'00	'05	'98	'00	'05
		B	<i>Amelanchier utahensis</i>	6	8	7	.78
B	<i>Artemisia tridentata vaseyana</i>	88	10	31	21.83	2.33	2.38
B	<i>Chrysothamnus depressus</i>	0	0	1	-	-	.15
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	19	17	25	.70	.19	.95
B	<i>Juniperus osteosperma</i>	1	1	0	-	-	-
B	<i>Mahonia repens</i>	0	0	1	-	-	-
B	<i>Purshia tridentata</i>	2	3	2	.03	.06	.00
B	<i>Quercus gambelii</i>	0	1	1	-	.15	.38
B	<i>Symphoricarpos oreophilus</i>	23	23	21	1.93	2.03	2.09
B	<i>Tetradymia canescens</i>	4	5	5	.06	.03	.06
Total for Browse		143	68	94	25.34	5.37	6.84

CANOPY COVER, LINE INTERCEPT --
 Management unit 10R, Study no: 22

Species	Percent Cover
	'05
Amelanchier utahensis	.78
Artemisia tridentata vaseyana	3.25
Chrysothamnus viscidiflorus viscidiflorus	2.29
Purshia tridentata	.15
Quercus gambelii	.03
Symphoricarpos oreophilus	2.88
Tetradymia canescens	.05

KEY BROWSE ANNUAL LEADER GROWTH --
 Management unit 10R, Study no: 22

Species	Average leader growth (in)
	'05
Amelanchier utahensis	5.1
Artemisia tridentata vaseyana	2.4
Purshia tridentata	3.9

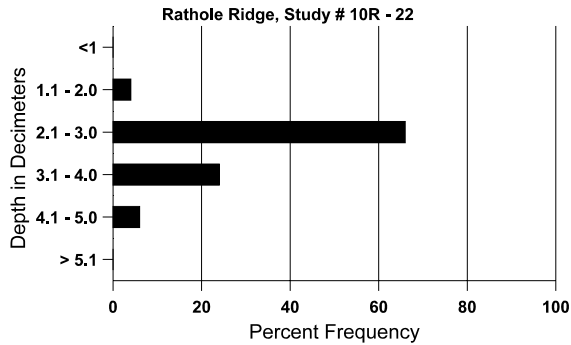
BASIC COVER --
 Management unit 10R, Study no: 22

Cover Type	Average Cover %		
	'98	'00	'05
Vegetation	62.92	46.29	56.63
Rock	.14	.24	.45
Pavement	.33	.34	.14
Litter	58.79	50.99	34.81
Cryptogams	.98	.07	0
Bare Ground	14.93	28.55	20.71

SOIL ANALYSIS DATA --
 Herd Unit 10R, Study # 22, Study Name: Rathole Ridge

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	ds/m
12.4	61.4 (13.7)	6.3	40.0	37.4	22.6	3.6	12.0	124.8	0.9

Stoniness Index



PELLET GROUP DATA --

Management unit 10R, Study no: 22

Type	Quadrat Frequency		
	'98	'00	'05
Rabbit	-	2	14
Elk	14	34	58
Deer	-	8	15
Cattle	8	-	8

Days use per acre (ha)		
'98	'00	'05
-	-	-
27 (68)	33 (81)	56 (137)
1 (3)	2 (5)	16 (40)
8 (20)	1 (2)	14 (34)

BROWSE CHARACTERISTICS --

Management unit 10R, Study no: 22

		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)
Amelanchier utahensis												
98	180	-	80	100	-	-	56	0	0	-	0	66/50
00	240	-	160	60	20	60	8	0	8	-	0	63/55
05	200	-	120	80	-	-	20	0	0	-	0	27/29
Artemisia tridentata vaseyana												
98	4060	520	800	2800	460	680	1	2	11	6	6	35/45
00	540	80	160	260	120	3760	11	0	22	-	0	27/27
05	1100	420	520	500	80	20	20	7	7	5	5	16/20
Chrysothamnus depressus												
98	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	2/10
05	60	-	-	60	-	-	0	0	-	-	0	3/9

		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 nauseosus hololeucus												
98	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	21/27
Chrysothamnus viscidiflorus viscidiflorus												
98	920	-	220	700	-	-	0	0	0	-	0	13/16
00	820	-	260	560	-	-	0	5	0	-	0	9/10
05	940	520	120	800	20	-	11	4	2	-	2	10/16
Juniperus osteosperma												
98	20	-	-	-	20	-	0	0	100	100	100	-/-
00	20	-	-	-	20	-	0	0	100	-	0	-/-
05	0	-	-	-	-	-	0	0	0	-	0	-/-
Mahonia repens												
98	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	20	-	-	20	-	-	0	0	-	-	0	4/5
Purshia tridentata												
98	60	-	40	20	-	-	33	0	-	-	0	22/62
00	140	-	120	20	-	100	0	0	-	-	0	14/26
05	40	-	-	40	-	-	50	50	-	-	0	11/21
Quercus gambelii												
98	0	-	-	-	-	-	0	0	-	-	0	-/-
00	60	-	60	-	-	-	0	0	-	-	0	-/-
05	20	-	20	-	-	-	0	0	-	-	0	25/10
Symphoricarpos oreophilus												
98	1200	100	620	580	-	-	20	0	-	-	0	19/32
00	1640	-	1400	240	-	-	0	0	-	-	0	13/18
05	1120	-	300	820	-	-	2	43	-	-	0	9/15
Tetradymia canescens												
98	100	-	100	-	-	-	0	0	-	-	0	-/-
00	160	-	160	-	-	-	0	0	-	-	0	-/-
05	140	20	-	140	-	-	0	0	-	-	0	6/9