

RATHOLE RIDGE - TREND STUDY NO. 10R-22-10

Vegetation Type: Mountain Big Sagebrush

Range Type: Crucial Deer Summer (Fawning habitat), Crucial Elk Summer (Calving habitat)

NRCS Ecological Site Description: [Mountain Stony Loam \(Browse\), R048AY451UT](#)

Land Ownership: BLM

Elevation: 8190 ft. (2497 m)

Aspect: Northwest

Slope: 6%

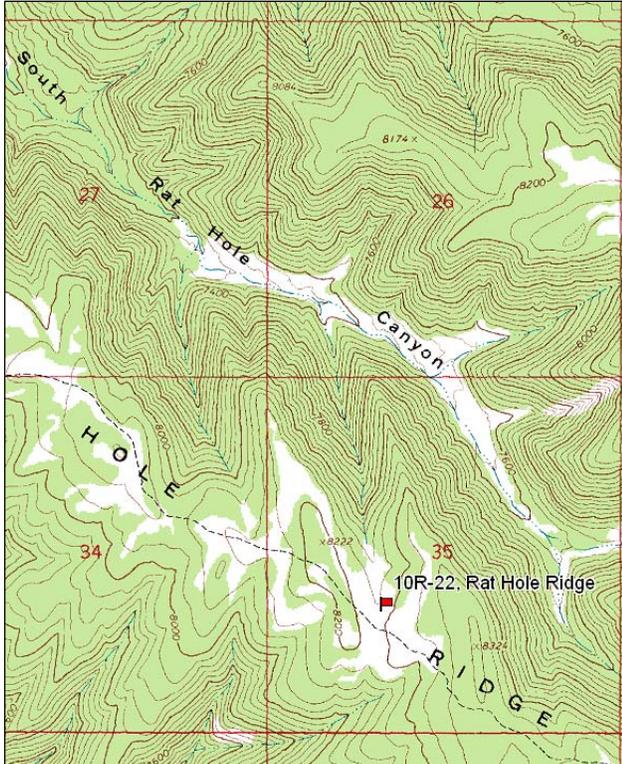
Transect bearing: 336° magnetic

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

Directions:

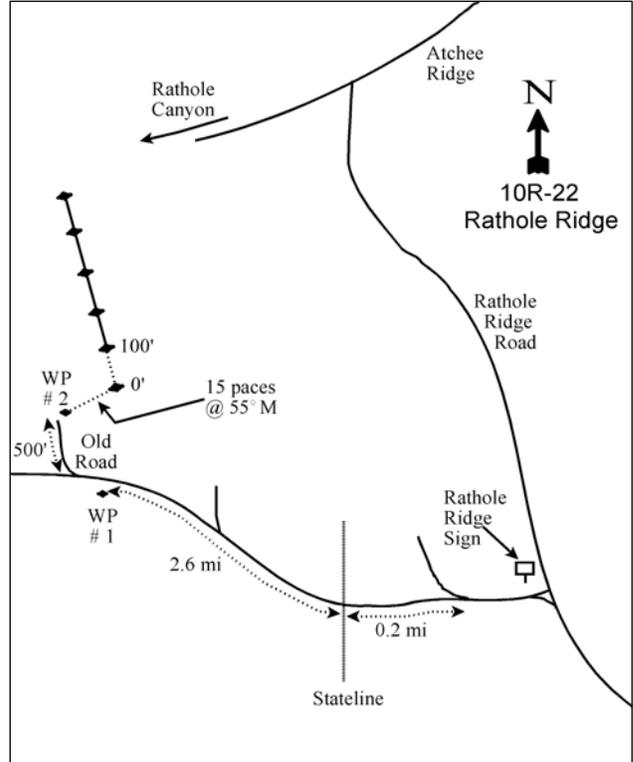
From the Junction of Atchee Ridge Road, Rathole Canyon and Rathole Ridge Road follow Rathole Ridge Road up to the a sign pointing to Rathole Ridge. Take this road to the first fork. Take a left at the fork and continue down the canyon 0.2 miles to the state line. Continue 2.6 miles down (staying left) 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-foot stake is 15 paces at 55°M and is marked with browse tag #111.

Map Name: Rat Hole Ridge



Township: 14S Range: 25E Section: 35

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 664191 E 4380011 N

## RATHOLE RIDGE - TREND STUDY NO. 10R-22

### Site Information

Site Description: The study is located in the North Book Cliffs in a sagebrush flat on top of a ridge that was burned in a prescribed fire in the fall of 1998 to reduce sagebrush cover and increase herbaceous vegetation. Grazing in the area is managed by the Bureau of Land Management (BLM) as part of the Atchee Ridge allotment. Pellet group transect data estimated moderate use by elk from 1998 to 2005, with light use in 2010. Estimated deer use was light from 1998 to 2005, but increased to moderate use in 2010. Estimated cattle use has been light since 1998 (Table - Pellet Group Data).

Browse: Prior to the fire, browse was prevalent on the site with the dominant species in cover being mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*). The fire removed much of the browse component and mountain big sagebrush cover decreased substantially in 2000 (Table - Browse Trends). 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 antelope bitterbrush (*Purshia tridentata*) and Utah serviceberry (*Amelanchier utahensis*). The sagebrush population is comprised of a mixture of mature and young plants with low decadence, good vigor and mostly light use. There is also a small population of mostly young serviceberry plants that has had light to moderate use over the course of the study (Table - Browse Characteristics). Many large serviceberry plants surround the transect on the ridge.

Herbaceous Understory: The herbaceous vegetation is the dominant and key component of this study. Grasses are diverse and abundant on the site. Needle-and-thread (*Stipa comata*), Kentucky bluegrass (*Poa pratensis*) and thickspike wheatgrass (*Agropyron dasystachyum*) are the most abundant, but other moderately abundant species include sedge (*Carex* sp.), subalpine needlegrass (*Stipa columbiana*), mutton bluegrass (*Poa fendleriana*) and prairie junegrass (*Koeleria cristata*). After the fire, perennial grass frequency and cover have increased. 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 2000, following the fire, but have steadily decreased since 2000 (Table - Herbaceous Trends).

Soil: Soils are loamy in texture and the soil reaction is slightly acidic (pH 6.3) (Table - Soil Analysis Data). Bare ground cover has been low with large amounts of vegetation and litter provided by herbaceous cover protecting the soil from erosion (Table - Basic Cover). The soil erosion condition was classified as stable in 2005 and 2010.

### Trend Assessments

#### Browse:

- **1998 to 2000 - down (-2):** The fire reduced browse species on the site. However, the decrease in mountain big sagebrush cover has provided room for preferred browse such as serviceberry and bitterbrush to resprout.
- **2000 to 2005 - stable (0):** There was little change in the browse component on the site.
- **2005 to 2010 - stable (0):** Mountain big sagebrush increased slightly in density and cover, but serviceberry decreased slightly.

#### Grass:

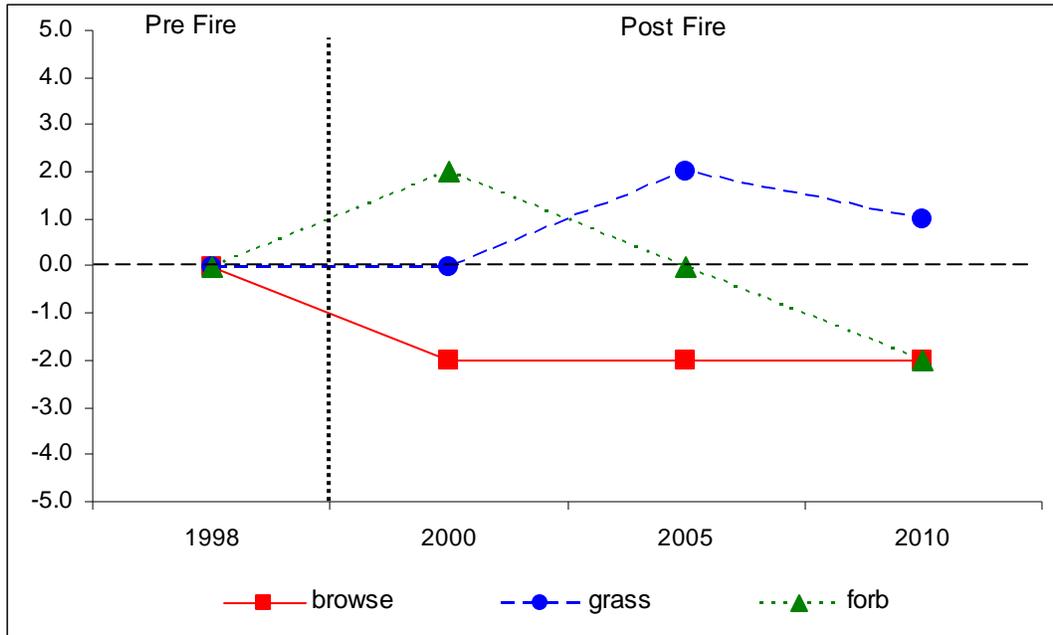
- **1998 to 2000 - stable (0):** There was a slight increase in the sum of nested frequency of perennial grasses, but cover decreased from 18% to 16%.
- **2000 to 2005 - up (+2):** The sum of nested frequency of perennial grasses increased by 20% and cover increased to 38%.
- **2005 to 2010 - slightly down (-1):** The perennial grass sum of nested frequency decreased by 9% and cover decreased to 23%.

Forb:

- **1998 to 2000 - up (+2):** The sum of nested frequency of perennial forbs increased by 22%, though there was little change in cover.
- **2000 to 2005 - down (-2):** The perennial forb sum of nested frequency decreased by 32% and cover decreased from 22% to 15%.
- **2005 to 2010 - down (-2):** There was a 20% decrease in the sum of nested frequency and cover decreased to 12%.

**Trend Summary**

CUMULATIVE RANGE TREND ASSESSMENT--  
 Management unit 10R, Study no: 22



**HERBACEOUS TRENDS--**

Management unit 10R, Study no: 22

Type	Species	Nested Frequency				Average Cover %			
		'98	'00	'05	'10	'98	'00	'05	'10
G	<i>Agropyron dasystachyum</i>	184	222	225	228	1.97	3.22	5.95	3.94
G	<i>Bouteloua gracilis</i>	-	1	-	-	-	.03	-	-
G	<i>Bromus carinatus</i>	b29	a5	a-	a-	.35	.06	-	-
G	<i>Bromus tectorum</i> (a)	2	-	-	-	.03	-	-	-
G	<i>Carex</i> sp.	a3	b54	b56	c139	.03	.73	.62	2.72
G	<i>Koeleria cristata</i>	b42	b36	a13	ab22	.52	.37	.51	.25
G	<i>Poa fendleriana</i>	b69	ab43	a29	ab44	1.45	.95	.72	1.04
G	<i>Poa nevadensis</i>	a-	b14	d115	c60	-	.19	2.38	2.69
G	<i>Poa pratensis</i>	a156	a162	ab202	b235	6.88	3.09	10.69	9.30
G	<i>Sitanion hystrix</i>	13	-	1	-	.10	-	.00	-
G	<i>Stipa columbiana</i>	a15	b76	b64	a13	.30	1.12	3.84	.71
G	<i>Stipa comata</i>	ab183	b137	b193	a81	6.68	5.70	12.82	2.56
Total for Annual Grasses		2	0	0	0	0.03	0	0	0

Type	Species	Nested Frequency				Average Cover %			
		'98	'00	'05	'10	'98	'00	'05	'10
Total for Perennial Grasses		694	750	898	822	18.30	15.47	37.55	23.23
Total for Grasses		696	750	898	822	18.34	15.47	37.55	23.23
F	<i>Achillea millefolium</i>	18	25	10	14	.19	.55	.24	.27
F	<i>Agoseris glauca</i>	a-	b41	b57	c159	-	.22	1.15	3.08
F	<i>Alyssum alyssoides</i> (a)	-	1	-	-	-	.00	-	-
F	<i>Androsace septentrionalis</i> (a)	a11	a-	b32	a9	.07	-	.25	.21
F	<i>Antennaria rosea</i>	27	21	13	16	.73	.55	.71	.34
F	<i>Arabis</i> sp.	8	-	-	-	.04	-	-	-
F	<i>Arenaria congesta</i>	c227	ab209	b173	a-	3.19	4.18	2.84	-
F	<i>Aster</i> sp.	a-	c45	b17	c44	-	.59	.25	1.22
F	<i>Astragalus convallarius</i>	ab13	b33	a4	a10	.22	.27	.04	.12
F	<i>Astragalus miser</i>	c155	c168	b79	a52	6.25	5.81	1.19	.86
F	<i>Calochortus nuttallii</i>	3	-	-	4	.03	-	.00	.01
F	<i>Castilleja flava</i>	b97	b82	a3	a-	2.02	1.60	.00	-
F	<i>Chaenactis douglasii</i>	-	-	-	6	-	-	-	.15
F	<i>Chenopodium leptophyllum</i> (a)	a-	a-	ab6	b15	-	-	.01	.25
F	<i>Crepis acuminata</i>	bc100	c125	b75	a19	1.42	1.70	1.41	.20
F	<i>Delphinium nuttallianum</i>	a4	a-	b25	ab12	.01	-	.14	.11
F	<i>Draba</i> sp. (a)	1	1	3	4	.03	.00	.00	.01
F	<i>Erigeron eatonii</i>	a12	b39	a9	a23	.05	.18	.04	.26
F	<i>Erigeron pumilus</i>	-	-	-	6	-	-	-	.03
F	<i>Eriogonum</i> sp.	2	-	-	-	.00	-	-	-
F	<i>Eriogonum umbellatum</i>	c25	ab8	bc28	a3	.55	.12	.56	.00
F	<i>Gayophytum ramosissimum</i> (a)	a-	a1	b16	a2	-	.00	.03	.00
F	<i>Geranium richardsonii</i>	ab36	b52	a24	a26	1.82	1.22	.76	.87
F	<i>Hackelia patens</i>	a1	b21	ab8	ab4	.00	.09	.07	.01
F	<i>Lappula occidentalis</i> (a)	-	-	-	5	-	-	-	.01
F	<i>Lupinus argenteus</i>	b28	b29	a-	a5	1.16	1.00	-	.00
F	<i>Penstemon caespitosus</i>	18	27	24	13	.37	.34	.90	.36
F	<i>Penstemon watsonii</i>	64	58	43	51	1.56	.98	1.36	1.35
F	<i>Phlox longifolia</i>	a15	b46	b58	b61	.05	.14	.26	.79
F	<i>Polygonum douglasii</i> (a)	b44	a2	c77	a4	.36	.00	.18	.00
F	<i>Potentilla gracilis</i>	a-	b14	b24	b28	-	.97	1.18	.82
F	<i>Potentilla pennsylvanica</i>	b19	b27	b13	a-	.87	.76	.65	-
F	<i>Senecio integerrimus</i>	a5	a-	ab19	b34	.04	-	.59	.38
F	<i>Taraxacum officinale</i>	15	29	22	16	.19	.21	.18	.30
F	<i>Thalictrum fendleri</i>	-	1	-	-	-	.00	-	-
F	<i>Tragopogon dubius</i>	2	3	-	-	.00	.00	-	-
F	Unknown forb-perennial	a-	a-	b30	a-	-	-	.08	-
F	<i>Viguiera multiflora</i>	9	-	-	-	.33	-	-	-
Total for Annual Forbs		56	5	134	39	0.46	0.01	0.48	0.49
Total for Perennial Forbs		903	1103	758	606	21.16	21.56	14.67	11.58
Total for Forbs		959	1108	892	645	21.62	21.58	15.15	12.08

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

BROWSE TRENDS--

Management unit 10R, Study no: 22

Type	Species	Strip Frequency				Average Cover %			
		'98	'00	'05	'10	'98	'00	'05	'10
B	Amelanchier utahensis	6	8	7	4	.78	.56	.81	.38
B	Artemisia tridentata vaseyana	88	10	31	41	21.83	2.33	2.38	3.03
B	Chrysothamnus depressus	0	0	1	5	-	-	.15	.09
B	Chrysothamnus viscidiflorus viscidiflorus	19	17	25	36	.70	.19	.95	1.31
B	Juniperus osteosperma	1	1	0	1	-	-	-	-
B	Mahonia repens	0	0	1	0	-	-	-	-
B	Purshia tridentata	2	3	2	2	.03	.06	.00	.15
B	Quercus gambelii	0	1	1	1	-	.15	.38	.15
B	Symphoricarpos oreophilus	23	23	21	19	1.93	2.03	2.09	1.60
B	Tetradymia canescens	4	5	5	6	.06	.03	.06	.06
Total for Browse		143	68	94	115	25.34	5.37	6.84	6.79

CANOPY COVER, LINE INTERCEPT--

Management unit 10R, Study no: 22

Species	Percent Cover	
	'05	'10
Amelanchier utahensis	.78	.75
Artemisia tridentata vaseyana	3.25	4.33
Chrysothamnus viscidiflorus viscidiflorus	2.29	1.31
Purshia tridentata	.15	.36
Quercus gambelii	.03	.03
Symphoricarpos oreophilus	2.88	1.63
Tetradymia canescens	.05	.13

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 10R, Study no: 22

Species	Average leader growth (in)	
	'05	'10
Amelanchier utahensis	5.1	2.5
Artemisia tridentata vaseyana	2.4	1.9
Purshia tridentata	3.9	3.5

BASIC COVER--

Management unit 10R, Study no: 22

Cover Type	Average Cover %			
	'98	'00	'05	'10
Vegetation	62.92	46.29	56.63	52.56
Rock	.14	.24	.45	.04
Pavement	.33	.34	.14	.00
Litter	58.79	50.99	34.81	45.27
Cryptogams	.98	.07	0	0
Bare Ground	14.93	28.55	20.71	17.96

SOIL ANALYSIS DATA --

Management unit 10R, Study no: 22, Study Name: Rathole Ridge

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
12.4	6.3	40.0	37.4	22.6	3.6	12.0	124.8	0.9

PELLET GROUP DATA--

Management unit 10R, Study no: 22

Type	Quadrat Frequency				Days use per acre (ha)			
	'98	'00	'05	'10	'98	'00	'05	'10
Rabbit	-	2	14	1	-	-	-	-
Elk	14	34	58	45	27 (68)	33 (81)	56 (137)	15 (36)
Deer	-	8	15	1	1 (3)	2 (5)	16 (40)	49 (121)
Cattle	8	-	8	9	8 (20)	1 (2)	14 (34)	16 (39)

BROWSE CHARACTERISTICS--

Management unit 10R, Study no: 22

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<b>Amelanchier utahensis</b>										
98	<b>180</b>	44	56	0	-	56	0	0	66/50	
00	<b>240</b>	67	25	8	-	8	0	0	63/55	
05	<b>200</b>	60	40	0	-	20	0	0	27/29	
10	<b>100</b>	80	20	0	-	0	20	0	35/34	
<b>Artemisia tridentata vaseyana</b>										
98	<b>4060</b>	20	69	11	520	1	2	6	35/45	
00	<b>540</b>	30	48	22	80	11	0	0	27/27	
05	<b>1100</b>	47	45	7	1020	20	7	5	16/20	
10	<b>2560</b>	38	55	6	-	30	5	0	15/20	
<b>Chrysothamnus depressus</b>										
98	<b>0</b>	0	0	-	-	0	0	0	-/-	
00	<b>0</b>	0	0	-	-	0	0	0	2/10	
05	<b>60</b>	0	100	-	-	0	0	0	3/9	
10	<b>1480</b>	74	26	-	-	0	0	0	2/7	
<b>Chrysothamnus nauseosus hololeucus</b>										
98	<b>0</b>	0	0	-	-	0	0	0	-/-	
00	<b>0</b>	0	0	-	-	0	0	0	-/-	
05	<b>0</b>	0	0	-	-	0	0	0	21/27	
10	<b>0</b>	0	0	-	-	0	0	0	23/26	
<b>Chrysothamnus viscidiflorus viscidiflorus</b>										
98	<b>920</b>	24	76	0	-	0	0	0	13/16	
00	<b>820</b>	32	68	0	-	0	5	0	9/10	
05	<b>940</b>	13	85	2	520	11	4	2	10/16	
10	<b>2120</b>	28	72	0	-	0	3	0	10/17	

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<b>Juniperus osteosperma</b>										
98	20	0	0	100	-	0	0	100	-/-	
00	20	0	0	100	-	0	0	0	-/-	
05	0	0	0	0	-	0	0	0	-/-	
10	20	0	100	0	-	100	0	0	-/-	
<b>Mahonia repens</b>										
98	0	0	0	-	-	0	0	0	-/-	
00	0	0	0	-	-	0	0	0	-/-	
05	20	0	100	-	-	0	0	0	4/5	
10	0	0	0	-	-	0	0	0	-/-	
<b>Purshia tridentata</b>										
98	60	67	33	-	-	33	0	0	22/62	
00	140	86	14	-	-	0	0	0	14/26	
05	40	0	100	-	-	50	50	0	11/21	
10	40	0	100	-	-	100	0	0	13/27	
<b>Quercus gambelii</b>										
98	0	0	0	-	-	0	0	0	-/-	
00	60	100	0	-	-	0	0	0	-/-	
05	20	100	0	-	-	0	0	0	25/10	
10	40	0	100	-	-	0	0	0	20/11	
<b>Symphoricarpos oreophilus</b>										
98	1200	52	48	-	100	20	0	0	19/32	
00	1640	85	15	-	-	0	0	0	13/18	
05	1120	27	73	-	-	2	43	0	9/15	
10	1480	8	92	-	-	57	16	0	16/23	
<b>Tetradymia canescens</b>										
98	100	100	0	-	-	0	0	0	-/-	
00	160	100	0	-	-	0	0	0	-/-	
05	140	0	100	-	20	0	0	0	6/9	
10	160	75	25	-	60	0	0	0	6/8	