

Trend Study 27-8-08

Study site name: Fivemile Mountain .

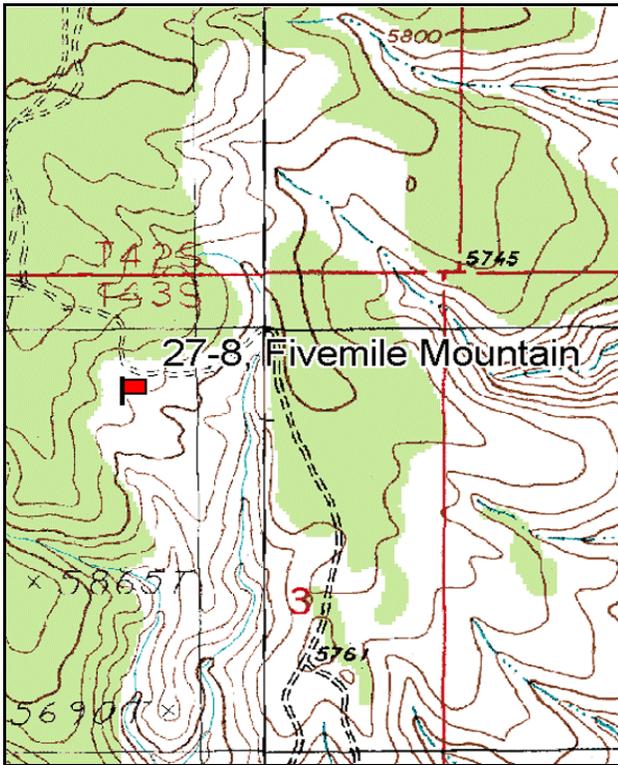
Vegetation type: Black Sagebrush .

Compass bearing: frequency baseline 125 degrees magnetic.

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

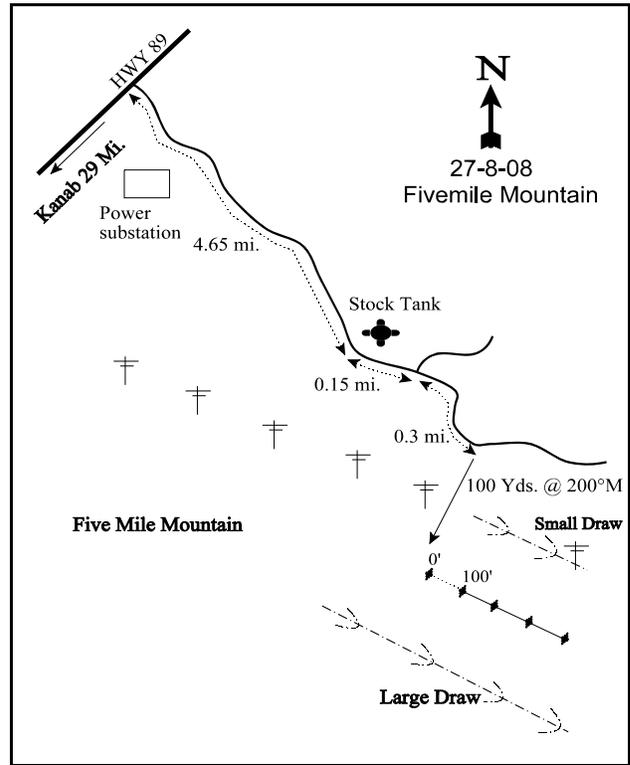
LOCATION DESCRIPTION

From the 90° turn in US 89 in the center of Kanab, go 29.0 miles south on US 89 to the turnoff to Fivemile Mountain. Turn right (southeast) and travel 4.6 miles on the graded road (BLM Rd #710) to a stock tank. Continue on a dirt road 0.15 miles to a fork, bear right. Continue up and over the mountain for 0.3 miles to a bend in the road. Stop here and walk about 100 yards south to the crest of a small ridge and the 0-foot baseline stake. The study runs E-SE down the ridge.



Map Name: Buckskin Mountain

Township 43S , Range 2W , Section 3



Diagrammatic Sketch

GPS: NAD 83, UTM 12S 410777 E, 4107025 N

## DISCUSSION

### Fivemile Mountain - Trend Study No. 27-8

#### Study Information

This study is located on the south slope of Fivemile Mountain, a low plateau that is important for mule deer during severe winters when they drop off of the Vermillion Cliffs [elevation: 5,850 feet (1,783 m), slope: 7%, aspect: east-southeast]. The range type is black sagebrush (*Artemisia nova*) interspersed with Utah juniper (*Juniperus osteosperma*). Pellet group transect data estimated deer use to be moderate in 2003 and 2008 (27 ddu/acre:66 ddu/ha and 35 ddu/acre:86 ddu/ha, respectively). Cattle use was estimated to be light with 5 days use/acre (13 cdu/ha) estimated in both 2003 and 2008.

#### Soil

In conjunction with low precipitation the shallow rocky soils are a limiting factor for vegetation on this site. Soil texture is a sandy clay loam with a neutral reaction (pH 7.2). Relative combined vegetation and litter cover decreased from 53% in 1992, to 50% in 1997 and 2003, to 46% in 2008. Relative combined rock and pavement cover ranged from 36%-41% from 1992 to 2008. Relative bare ground cover ranged from 7%-12% from 1992 to 2008. The erosion condition rating was classified as stable in 2003 and 2008.

#### Browse

The dominant browse species is black sagebrush which has accounted for more than 75% of the browse cover since 1992. Density estimates increased between 1987 and 1992, primarily due to the much larger sample used beginning in the 1992 field season. The black sagebrush population was estimated at 5,980 plants/acre in 1992, decreasing to 4,420 plants/acre in 1997, increasing to 5,260 plants/acre in 2003, and decreasing to 4,800 plants/acre in 2008. Utilization was moderate to heavy on sagebrush sampled in 1987 and 2008, but more light to moderate in all other samples. Sagebrush displaying poor vigor was relatively low in most sample years except for 2003 when it increased to 30%. Decadence ranged from 24%-32% from 1987 to 1997, but increased to around 60% in 2003 and 2008. Recruitment of sagebrush has remained low with young plants comprising 2% of the population in 1997, 2003, and 2008. A high number of dead plants were counted in 1997, 2003, and 2008 without a large decrease in density, suggesting a rather rapid turnover of black sagebrush. Increases in decadence and poor vigor as well as low reproduction can be attributed to the dry conditions experienced prior to and including the 2008.

If it was more common, Stansbury cliffrose (*Cowania mexicana* ssp. *stansburiana*) could be a key browse species. Scattered large plants are found west of the study site. These shrubs average 10 feet in height and have been hedged, but not severely. There are occasional seedling and young plants along the ridge. Juniper on the site exhibit the harshness of the growing conditions by their stunted, twisted forms. Some individual juniper trees are highlined. Point-center quarter data estimated 42 juniper trees/acre in 2003 and 46 trees/acre in 2008. There are a few young pinyon pine (*Pinus edulis*) scattered around as well. Other common shrubs are the increasers broom snakeweed (*Gutierrezia sarothrae*) and stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *stenophyllus*).

#### Herbaceous Understory

The herbaceous understory is poor and has at times been dominated by cheatgrass (*Bromus tectorum*), which had significantly increased in nested frequency from 1992 to 2003, but significantly decreased in 2008. Cheatgrass accounted for 49% of the grass cover in 1997, increasing to 66% in 2003, and decreasing to 17% in 2008. Perennial species are infrequent and have a lower combined sum of nested frequency value than cheatgrass. Perennial grasses that have been sampled include blue grama (*Bouteloua gracilis*), needle-and-thread (*Stipa comata*), Sandberg bluegrass (*Poa secunda*), Indian ricegrass (*Oryzopsis hymenoides*), and bottlebrush squirreltail (*Sitanion hystrix*). Perennial forbs are very rare in all surveys. Only longleaf phlox (*Phlox longifolia*) has been encountered in all sample years, and then only at low frequencies.

### 1992 TREND ASSESSMENT

The trend for browse is stable. Decadence of black sagebrush has decreased somewhat, from 16% in 1987 to 9%. Density sampling methods were changed since the last reading so density can't be compared since 1987. The trend for both the grasses and forbs is slightly up. There was a slight increase in nested frequency values for the perennial grasses and forbs, but the herbaceous understory is still in very poor condition.

winter range condition (DCI) - good (48) Low potential scale  
browse - stable (0)                      grass - slightly up (+1)                      forb - slightly up (+1)

### 1997 TREND ASSESSMENT

Trend for the primary browse species, black sagebrush, is slightly down. Sagebrush population density has declined 26% since 1992 to 4,420 plants/acre. Sagebrush plants showing poor vigor increased from 9% in 1992 to 13%, and decadence increased from 24% in 1992 to 31%. Recruitment of sagebrush is low with young plants comprising only 2% of the population. This is probably not adequate to replace the decadent/dying plants, indicating a continued decline in density unless more favorable conditions for seedling establishment return to the area. Trend for the grasses is slightly down. Sum of nested frequency and cover of perennial grasses has remained similar to 1992 levels, but the invasive annual, cheatgrass, has significantly increased in nested frequency and substantially increased in cover. The trend for forbs is stable. The sum of nested frequency of perennial forbs has declined slightly, but there was a large decrease in the sum of nested frequency and cover of annual forbs as well.

winter range condition (DCI) - poor-fair (26) Low potential scale  
browse - slightly down (-1)                      grass - slightly down (-1)                      forb - stable (0)

### 2003 TREND ASSESSMENT

Trend for browse is slightly down. Although the population density estimate for black sagebrush is slightly higher than in 1997 at 5,260 plants/acre, most of the key population parameters show negative changes. The most notable changes are the increase in decadence from 31% in 1997 to 61% and the increase in the proportion of the population showing poor vigor from 13% in 1997 to 30%. Recruitment from young plants remains very low at 2%, and far below the level needed to replace the decadent and dying individuals in the population. The number of dead sagebrush plants also increased in 2003 to 1,480 dead plants/acre. Trend for both the grasses and forbs is down. Sum of nested frequency values for perennial grasses declined by 41%, though total cover of perennial grasses remained similar to 1997 values. Cheatgrass continues to dominate the site constituting 66% of the total grass cover, and showed increases in both nested frequency and total cover. The sum of nested frequency of perennial forbs declined since 1997, but total cover of perennial forbs increased from less than 0.25% of total cover in 1997 to just over 1%. The sum of nested frequency and total cover of annual forbs increased substantially since 1997. The negative trends for black sagebrush and declining number of perennial grasses and forbs may be attributed to drier precipitation patterns prior to and including the 2003 survey.

winter range condition (DCI) - poor (14) Low potential scale  
browse - slightly down (-1)                      grass - down (-2)                      forb - down (-2)

### 2008 TREND ASSESSMENT

Trend for browse is stable. Density of the primary browse species, black sagebrush, decreased slightly, but was similar to 2003 at 4,800 plants/acre. Sagebrush plants displaying poor vigor decreased from 30% in 2003 to 18%, and decadence remained similar to 2003 values at 60%. Recruitment has remained constant, but low, with young sagebrush plants comprising only 2% of the population. Trend for both the grasses and forbs is slightly up. Sum of nested frequency and total cover of perennial grasses has remained similar, but the frequency and total cover of cheatgrass has significantly decreased. Forbs show a similar trend with little change in the sum of nested frequency and total cover of perennial forbs, but a large decrease in the sum of

nested frequency and total cover of annual forbs. The herbaceous understory remains in very poor condition, however.

winter range condition (DCI) - poor (22) Low potential scale  
browse - stable (0)      grass - slightly up (+1)      forb - slightly up (+1)

HERBACEOUS TRENDS --  
 Management unit 27 , Study no: 8

T y p e	Species	Nested Frequency					Average Cover %			
		'87	'92	'97	'03	'08	'92	'97	'03	'08
G	<i>Bouteloua gracilis</i>	a15	b42	b42	b40	b37	1.25	.91	1.39	.82
G	<i>Bromus tectorum</i> (a)	-	a18	c180	c202	b75	.07	2.44	6.59	.51
G	<i>Hilaria jamesii</i>	-	3	-	3	-	.03	-	.15	-
G	<i>Oryzopsis hymenoides</i>	ab12	c38	bc31	a10	a10	.51	.21	.16	.03
G	<i>Poa fendleriana</i>	-	3	3	3	1	.03	.00	.00	.03
G	<i>Poa secunda</i>	a-	b14	c35	a6	a7	.08	.40	.06	.02
G	<i>Sitanion hystrix</i>	b51	a22	a15	a2	a20	.15	.41	.03	.26
G	<i>Stipa comata</i>	48	25	40	32	40	.39	.28	.47	1.09
G	<i>Stipa speciosa</i>	-	1	4	5	1	.00	.15	.15	.15
G	<i>Vulpia octoflora</i> (a)	-	c107	b58	c104	a8	.34	.12	.96	.02
Total for Annual Grasses		0	125	238	306	83	0.41	2.56	7.55	0.53
Total for Perennial Grasses		126	148	170	101	116	2.46	2.38	2.42	2.41
Total for Grasses		126	273	408	407	199	2.87	4.95	9.98	2.94
F	<i>Alyssum alyssoides</i> (a)	-	-	a-	b15	a-	-	-	.06	-
F	<i>Astragalus</i> sp.	b13	c40	b20	a-	b10	.12	.07	-	.03
F	<i>Calochortus nuttallii</i>	-	9	3	1	-	.02	.01	.00	.00
F	<i>Collinsia parviflora</i> (a)	-	-	2	5	3	-	.00	.01	.00
F	Cruciferae	-	6	-	-	-	.04	-	-	-
F	<i>Descurainia pinnata</i> (a)	-	8	4	10	-	.02	.01	.05	-
F	<i>Draba cuneifolia</i> (a)	-	b19	a-	ab8	a1	.09	-	.02	.00
F	<i>Eriogonum cernuum</i> (a)	-	2	1	-	10	.03	.00	-	.02
F	<i>Erodium cicutarium</i> (a)	-	-	a12	b31	a-	-	.19	1.74	-
F	<i>Erigeron pumilus</i>	b23	a2	ab13	a-	a-	.03	.02	-	-
F	<i>Gilia inconspicua</i> (a)	-	c139	a16	b57	a-	.48	.03	1.11	-
F	<i>Lappula occidentalis</i> (a)	-	b146	a6	a-	a15	.48	.01	-	.05
F	<i>Lomatium</i> sp.	-	5	1	-	2	.03	.03	-	.01
F	<i>Mentzelia</i> sp.	a-	a-	a-	b14	ab7	-	-	1.01	.06
F	<i>Penstemon thompsoniae</i>	-	1	1	-	-	.03	.00	-	-
F	<i>Phlox longifolia</i>	a3	b25	ab15	a5	ab6	.25	.06	.06	.02
F	<i>Sphaeralcea grossulariifolia</i>	-	3	-	-	-	.00	-	.01	-

Type	Species	Nested Frequency					Average Cover %			
		'87	'92	'97	'03	'08	'92	'97	'03	'08
F	Unknown forb-annual (a)	-	5	-	-	-	.01	-	-	-
F	Zigadenus paniculatus	-	1	-	-	-	.00	-	-	-
Total for Annual Forbs		0	319	41	126	29	1.11	0.25	3.00	0.09
Total for Perennial Forbs		39	92	53	20	25	0.54	0.21	1.09	0.12
Total for Forbs		39	411	94	146	54	1.65	0.46	4.09	0.21

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

#### BROWSE TRENDS --

Management unit 27 , Study no: 8

Type	Species	Strip Frequency				Average Cover %			
		'92	'97	'03	'08	'92	'97	'03	'08
B	Artemisia nova	86	79	80	79	22.60	13.00	12.19	14.75
B	Ceratoides lanata	1	2	2	0	.00	.00	.00	-
B	Chrysothamnus viscidiflorus stenophyllus	25	20	21	23	2.09	1.18	.72	1.26
B	Gutierrezia sarothrae	4	8	6	4	.19	.01	.33	.03
B	Juniperus osteosperma	2	2	2	2	2.49	.00	1.92	2.69
B	Opuntia sp.	1	2	5	5	.00	.38	.38	.21
B	Sclerocactus sp.	5	3	5	6	.18	.15	.06	.07
Total for Browse		124	116	121	119	27.55	14.72	15.61	19.02

#### CANOPY COVER, LINE INTERCEPT --

Management unit 27 , Study no: 8

Species	Percent Cover		
	'97	'03	'08
Artemisia nova	-	14.50	18.20
Chrysothamnus viscidiflorus stenophyllus	-	.63	1.14
Juniperus osteosperma	3.00	2.56	1.46
Opuntia sp.	-	.03	-
Sclerocactus sp.	-	.05	.05

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 27 , Study no: 8

Species	Average leader growth (in)	
	'03	'08
Artemisia nova	0.9	1.4

POINT-QUARTER TREE DATA --

Management unit 27 , Study no: 8

Species	Trees per Acre		Average diameter (in)	
	'03	'08	'03	'08
Juniperus osteosperma	42	46	9.0	11.7

BASIC COVER --

Management unit 27 , Study no: 8

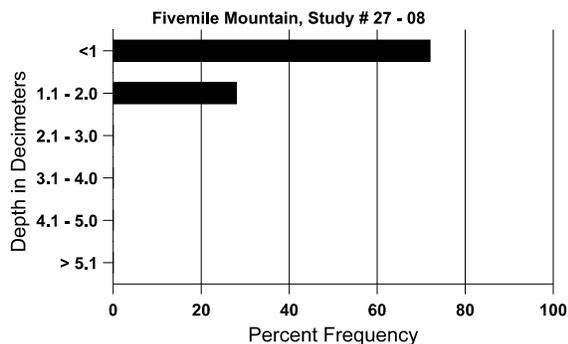
Cover Type	Average Cover %				
	'87	'92	'97	'03	'08
Vegetation	2.75	30.85	23.60	30.53	23.50
Rock	19.50	44.86	18.30	21.68	21.56
Pavement	28.00	0	18.18	21.40	24.89
Litter	36.00	29.56	28.00	26.07	28.59
Cryptogams	5.25	1.31	2.51	.76	1.20
Bare Ground	8.50	8.08	12.39	11.49	14.12

SOIL ANALYSIS DATA --

Management unit 27, Study no: 8, Study Name: Fivemile Mountain

Effective rooting depth (in)	Temp °F (depth)	pH	sandy clay loam			%0M	PPM P	PPM K	dS/m
			%sand	%silt	%clay				
10.7	74.0 (10.0)	7.2	58.4	19.1	22.6	2.1	16.0	115.2	0.7

### Stoniness Index



PELLET GROUP DATA --

Management unit 27 , Study no: 8

Type	Quadrat Frequency			
	'92	'97	'03	'08
Rabbit	8	9	8	44
Deer	16	28	26	29
Cattle	-	2	2	1

Days use per acre (ha)	
'03	'08
-	-
27 (66)	35 (86)
5 (13)	5 (13)

BROWSE CHARACTERISTICS --

Management unit 27 , Study no: 8

		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>Artemisia nova</i>												
87	<b>2531</b>	133	66	1666	799	-	37	11	32	2	16	12/20
92	<b>5980</b>	160	740	3800	1440	-	22	0	24	7	9	-/-
97	<b>4420</b>	100	80	2980	1360	1040	32	2	31	13	13	16/28
03	<b>5260</b>	-	80	1980	3200	1480	6	0	61	30	30	13/23
08	<b>4800</b>	120	80	1860	2860	1460	42	25	60	12	18	16/28
<i>Atriplex canescens</i>												
87	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
92	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
97	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
03	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
08	<b>0</b>	-	-	-	-	-	0	0	-	-	0	27/27
<i>Ceratoides lanata</i>												
87	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
92	<b>20</b>	20	-	20	-	-	0	0	-	-	0	-/-
97	<b>40</b>	-	-	40	-	-	0	0	-	-	0	9/7
03	<b>40</b>	-	-	40	-	-	50	0	-	-	0	11/8
08	<b>0</b>	-	-	-	-	-	0	0	-	-	0	18/13
<i>Chrysothamnus viscidiflorus stenophyllus</i>												
87	<b>932</b>	-	-	533	399	-	0	0	43	4	43	10/9
92	<b>780</b>	-	40	640	100	-	0	0	13	3	10	-/-
97	<b>660</b>	-	20	420	220	40	0	0	33	9	9	11/21
03	<b>560</b>	-	-	300	260	-	0	0	46	25	29	12/22
08	<b>740</b>	-	20	520	200	20	0	0	27	3	16	13/21

		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)
<i>Cowania mexicana stansburiana</i>												
87	0	66	-	-	-	-	0	0	-	-	0	-/-
92	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	78/101
08	0	-	-	-	-	-	0	0	-	-	0	66/85
<i>Gutierrezia sarothrae</i>												
87	1198	399	66	1066	66	-	0	0	6	-	6	7/7
92	100	80	-	100	-	-	0	0	0	-	0	-/-
97	220	-	-	180	40	80	0	0	18	-	0	7/7
03	140	-	-	140	-	20	0	0	0	-	0	7/7
08	140	20	20	80	40	40	0	0	29	14	29	8/12
<i>Juniperus osteosperma</i>												
87	66	-	-	-	66	-	0	0	100	-	0	-/-
92	40	-	20	20	-	-	0	0	0	-	0	-/-
97	40	-	20	20	-	20	0	0	0	-	0	-/-
03	40	-	-	40	-	20	0	0	0	-	0	-/-
08	40	-	20	20	-	20	0	0	0	-	0	-/-
<i>Opuntia sp.</i>												
87	0	-	-	-	-	-	0	0	0	-	0	-/-
92	20	-	-	20	-	-	0	0	0	-	0	-/-
97	60	-	-	60	-	-	0	0	0	-	0	9/27
03	100	-	20	80	-	-	0	0	0	-	0	10/23
08	100	-	20	40	40	-	0	0	40	20	20	9/15
<i>Sclerocactus sp.</i>												
87	0	66	-	-	-	-	0	0	0	-	0	-/-
92	100	-	40	40	20	-	0	0	20	20	20	-/-
97	60	-	20	40	-	-	0	0	0	-	0	5/8
03	100	-	20	40	40	-	0	0	40	40	40	4/5
08	120	-	20	100	-	-	0	0	0	-	0	5/6
<i>Yucca sp.</i>												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
92	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	19/25
08	0	-	-	-	-	-	0	0	-	-	0	21/22