Trend Study 22-6-08

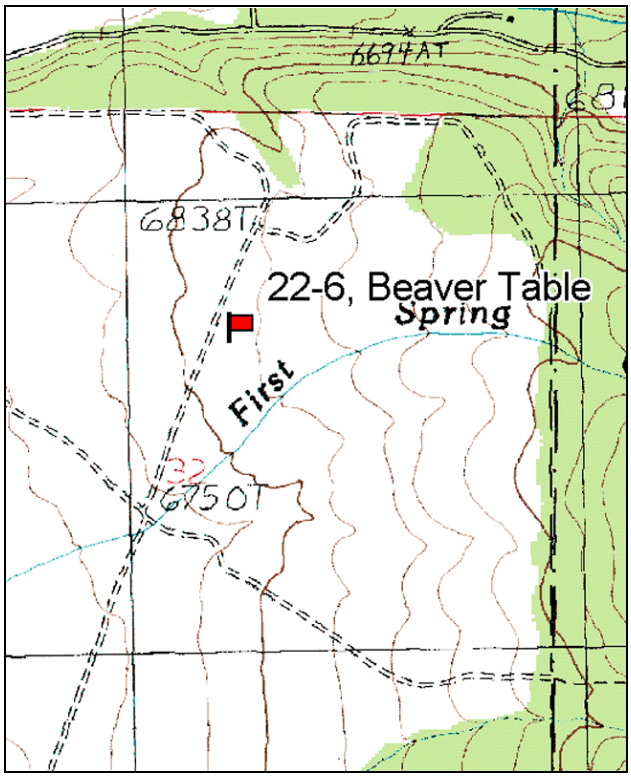
Study site name: Beaver Table . Vegetation type: Cabled, Seeded P-J .

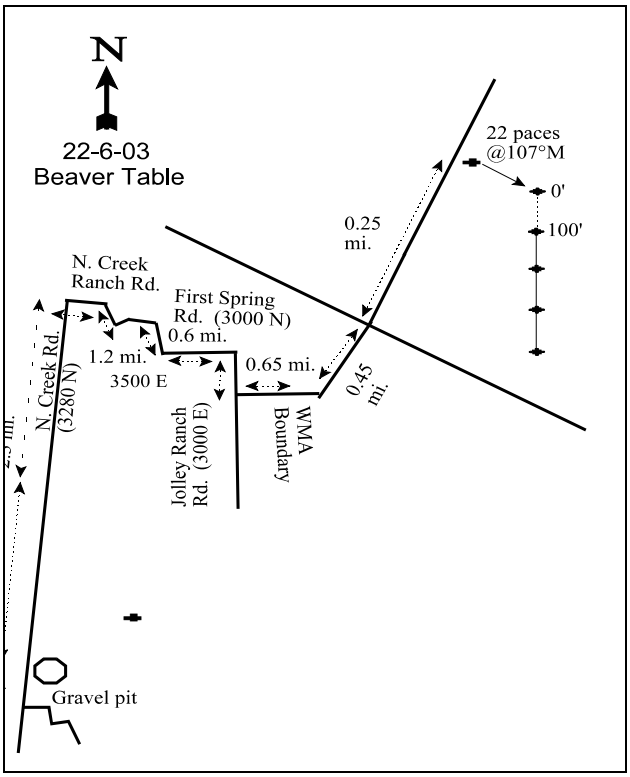
Compass bearing: frequency baseline 180 degrees magnetic.

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

LOCATION DESCRIPTION

From the corner of North Creek Road and SR 153 in Beaver, go north 1.95 miles to a gravel pit on the right. From the gravel pit, continue on North Creek Road for 2.3 miles. Turn on to North Creek Ranch Road and follow for 1.2 miles and then turn onto First Spring Road (3000 N) for 0.6 miles.Then turn onto Jolley Ranch Road (3000 N) and take the first left. Continue for 0.35 miles and go through the gate. There should be a WMA boundary to the south. Go east past the boundary fence 0.25 miles to another fenceline with a fork just beyond it. Go straight (east) another 0.25 miles to a junction with a road going north-south, then turn left (north). Go 0.45 miles to a junction with a road going east-west. Continue north 0.2 miles to a witness post on the right. From the witness post walk 22 paces at 107 degrees magnetic. The 0-foot stake is marked by rebar tagged #7049.





Map Name: Beaver

Diagrammatic Sketch

Township 28S , Range 6W , Section 32

GPS: NAD 83, UTM 12S 364159 E, 4243887 N

DISCUSSION

Beaver Table - Trend Study No. 22-6

Study Information

The Beaver Table trend study is located on a bench at the base of the Tushar Mountains northeast of Beaver [elevation: 6,800 feet (2,073m), slope: 3-5%, aspect: west]. This area is recognized as critical range to wintering deer, especially since completion of I-15 has restricted movement to the extensive historical winter ranges west of the interstate. The study is in the center of a Division of Wildlife Resources owned section, which was cabled and seeded in 1957. The community is dominated by Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) with scattered bitterbrush (*Purshia tridentata*) and juniper (*Juniperus osteosperma*). The DWR has not recently allowed grazing, although a few cattle pats were sampled in the pellet group transect in 2003. A DWR pellet group transect was located near the trend study site. It showed an average of 40 deer days use/acre (99 ddu/ha) between 1981 and 1985 (Jense et al. 1985). Through the winter of 1990-91, the average was even higher at 56 deer days use/acre (138 ddu/ha) (Jense et al. 1991). Between 1993 and 1997, deer use averaged 18 days use/acre (44 ddu/ha) (Evans et al. 1997). Pellet group transcects read with the vegetation transect estimated at 47 deer days use/acre(116 ddu/ha) in 1998, 71 deer days use/acre (175 ddu/ha) in 2003, and 125 deer days use/acre (308 ddu/ha) in 2008. Fifteen elk days use/acre (36 edu/ha) were also estimated in 2008.

Soil

The study lies within the Ushar-Phage association (USDA-NRCS 2007). Soils are very deep, well drained soils on nearly level alluvial fans. Textural and chemical analysis indicates a clay soil with a neutral pH (6.6). There is a lime cemented hardpan approximately two feet below the surface, which could limit rooting depth. A number of large rocks from basaltic parent material are found throughout the soil profile. There is also a concentration of rocks and pavement on and near the soil surface. Good litter and vegetation cover and the gentle slope moderate the hazard of severe soil erosion. Some overland water movement was apparent near the end of the transect prior to the 2003 reading. Pedestalling is moderate around the base of sagebrush stems and soil movement was noticeable. An erosion condition class assessment rated soils as stable to slightly eroding in 2003 and stable in 2008.

Browse

The dominant and key browse species is Wyoming big sagebrush. Density was estimated at 5,420 plants/acre in 1998, 5,740 plants/acre in 2003, and 4,720 plants/acre in 2008. The relatively large decrease in sagebrush density from 1991 to 1998 may be due to the change in sampling methods. Recruitment by young plants has been very low since 1998 with an average of less than 2%. Decadence since 1985 has averaged over 40%. This population is currently best categorized as overly mature with a moderate to high rate of decadence. Decadence was very high in 1991 and 1998 (53% and 48%), but more moderate in 1985 and 2003 (26% and 31%). In 2008, it again exceeded 40%. Utilization has been consistent over all years with most plants showing light to moderate use. Plants displaying poor vigor has also been relatively consistent over all years (7-16%). Sagebrush cover has averaged about 16% since 1998.

Although less abundant, antelope bitterbrush (*Purshia tridentata*) provides additional forage on this site. It is a highly preferred species by deer and has been moderately to heavily hedged in all readings. Bitterbrush density was estimated at 780 plants/acre in 1998, 600 plants/acre in 2003, and 740 plants/acre in 2008. Browsing intensity does not seem to have adversely affected bitterbrush vigor as it can tolerate twice the utilization that sagebrush can and still recover. Recruitment by young plants was high in 1991 and 1998, but no young were sampled in 2003 and remained low in 2008.

Utah juniper trees are scattered over the area and show signs of reinvasion in the upper end of the treated section. Juniper density was estimated at 107 trees/acre in 1998, 95 trees/acre in 2003, and 89 trees/acre in

2008. Between 2003 and 2008 a dedicated hunter project had removed some of the trees. Broom snakeweed (*Gutierrezia sarothrae*), an undesirable increaser, shows high fluctuations in density between all years.

Herbaceous Understory

Cheatgrass (*Bromus tectorum*) dominated the understory in 1998 and was sampled in 99 out of 100 quadrats. With drought conditions and timing of precipitation in 2003, cheatgrass significantly declined in nested frequency and average cover and was sampled in only 38% of the quadrats. In 2008, it continued to decrease to only 9% quadrat frequency. Bottlebrush squirreltail (*Sitanion hystrix*) has been the most abundant perennial species in all surveys, but has steadily declined in frequency since 1991. Indian ricegrass (*Oryzopsis hymenoides*), muttongrass (*Poa fendleriana*), and bluebunch wheatgrass (*Agropyron spicatum*) occur rather sporadically, but enough to provide some forage. In 2003 and 2008, perennial grass cover was only about 3%.

A variety of forbs have been sampled on the site. Fourteen species of perennial forbs were sampled in 1998, 15 in 2003, and 9 in 2008. However, total cover for perennial forbs has never been more than 1%. The highest value was in 1998, since then cover has been steadily decreasing to where it now is only two-tenths of 1%. The continuing drought has had a substantial affect on forbs. Annual species are present but limited and cyclic relative to the timing of precipitation.

1991 TREND ASSESSMENT

Browse trend is stable. Wyoming big sagebrush density increased, but decadence has increased to 53%. Broom snakeweed decreased by 84%. A positive for this site is the increase of bitterbrush density and the abundance of young plants in the population. Trend for perennial grasses is stable. There was a slight downward change in nested frequency, but no species nested frequency change was significant. The trend for perennial forbs is also considered stable as there is little change in nested frequency as it has been relatively stable since 1985.

browse - stable (0) grass - stable (0) forb - stable (0)

1998 TREND ASSESSMENT

The browse trend is stable. Decadence in the Wyoming big sagebrush population remains very high at 48%. Differences in density are likely due to changes in the sampling method. The perennial grass trend is slightly down with a deline in sum of nested frequency. The trend for perennial forbs is stable with little change in their nested frequency value. Forbs contribute little forage value to this site. Perennial grasses, the most important component of the herbaceous understory on this site, shows a slow, but consistent decline in sum of nested frequency over all years.

Winter Range Condition (DCI) - fair (38) low potential scale
browse - stable (0) grass - slightly down (-1) forb - stable (0)

2003 TREND ASSESSMENT

Trend for browse is stable. Wyoming big sagebrush has a decreased rate of decadence (from 48% to 31%). Young plants make up less than 1% of the population. Vigor is generally normal throughout the population. Bitterbrush shows a slight decline in population density and increased decadence. Trend for the perennial grasses is slightly down with a decline in sum of nested frequency, a trend that has been observed since 1985. Bottlebrush squirreltail, Indian ricegrass, and bluebunch wheatgrass all have lower nested frequency values since 1998. Cheatgrass has also decreased significantly (75%) in nested frequency. There was a slight increase in perennial forb sum of nested frequency (but not significant) that is a positive sign especially during the current drought period. However, forbs combine to provide only 1% total cover.

Winter Range Condition (DCI) - fair (41) low potential scale
browse - stable (0) grass - slightly down (-1) forb - stable (0)

2008 TREND ASSESSMENT

Trend for browse is down. Wyoming big sagebrush population has decreased by 18%, decadence has increased to 44%, and recruitment has continued to be very low at only 3%. The overall recruitment average since 1991 has only been 2%. Bitterbrush shows a slight increase in density, but this is offset with a very high increase in decadence. Trend for the perennial grasses is stable as nested frequency is actually slightly up but not a significant change. Bottlebrush squirreltail, Indian ricegrass, and bluebunch wheatgrass all have similar values. The trend for forbs is down as there was a large decrease in perennial forb sum of nested frequency. The lowest value that has been recorded. To go along with this is the lowest total cover contributed by perennial forbs at only two-tenths of 1%.

Winter Range Condition (DCI) - fair (32) low potential scale
browse - down (-2) grass - stable (0) forb - down (-2)

HERBACEOUS TRENDS --
Management unit 22 , Study no: 6

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'98	'03	'08	'98	'03	'08
G	Agropyron cristatum	a-	a-	a1	a3	b11	.00	.03	.10
G	Agropyron intermedium	-	-	-	-	1	-	-	.15
G	Agropyron spicatum	a-	a-	b14	a5	a5	.44	.01	.21
G	Bromus japonicus (a)	-	-	4	5	5	.03	.01	.03
G	Bromus tectorum (a)	-	-	c345	b80	a22	11.17	.61	.07
G	Oryzopsis hymenoides	ab35	a24	b50	ab34	b48	2.58	1.09	1.46
G	Poa fendleriana	20	17	19	38	17	.71	.56	.44
G	Poa pratensis	a-	a-	a1	a2	b13	.03	.03	.14
G	Sitanion hystrix	c182	c180	b114	a61	a54	3.65	1.26	.66
G	Stipa lettermani	1	3	-	-	4	-	-	.15
Total for Annual Grasses		0	0	349	85	27	11.20	0.62	0.10
Total for Perennial Grasses		238	224	199	143	153	7.42	3.00	3.32
Total for Grasses		238	224	548	228	180	18.62	3.62	3.43
F	Agoseris glauca	-	-	7	4	7	.01	.01	.04
F	Alyssum alyssoides (a)	-	-	a5	a8	b175	.01	.03	.53
F	Antennaria rosea	-	-	6	1	1	.04	.00	.03
F	Arabis demissa	b15	c27	a6	a3	a-	.01	.01	-
F	Astragalus convallarius	a3	a-	b8	a4	a-	.15	.06	-
F	Astragalus sp.	-	-	4	-	-	.03	-	-
F	Castilleja chromosa	-	6	-	-	1	.00	-	.00
F	Calochortus nuttallii	a2	a-	a-	b15	b8	-	.06	.05
F	Chaenactis douglasii	b35	b33	a6	a1	a-	.04	.00	-
F	Cymopterus sp.	4	-	-	6	2	-	.01	.01
F	Descurainia pinnata (a)	-	-	-	1	-	-	.00	-

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'98	'03	'08	'98	'03	'08
F	Epilobium brachycarpum (a)	-	-	$_{c}$31	$_{b}$10	$_{a}$-	.09	.02	-
F	Erigeron sp.	-	-	-	1	-	-	.00	-
F	Eriogonum shockleyi	-	-	-	6	-	-	.03	-
F	Eriogonum umbellatum	3	2	6	3	-	.06	.01	-
F	Gayophytum ramosissimum(a)	-	-	-	6	6	-	.05	.06
F	Gilia sp. (a)	-	-	-	6	-	-	.02	-
F	Lappula occidentalis (a)	-	-	-	1	9	-	.00	.04
F	Lactuca serriola	-	-	2	-	-	.00	-	-
F	Lotus utahensis	-	-	1	2	-	.00	.01	-
F	Machaeranthera canescens	$_{a}$3	$_{a}$-	$_{b}$10	$_{a}$-	$_{a}$-	.17	-	-
F	Penstemon sp.	-	-	1	-	-	.03	-	-
F	Phlox longifolia	$_{a}$17	$_{b}$42	$_{ab}$41	$_{b}$52	$_{a}$15	.15	.18	.03
F	Polygonum douglasii (a)	-	-	$_{ab}$9	$_{b}$24	$_{a}$2	.02	.05	.00
F	Ranunculus testiculatus (a)	-	-	-	2	4	-	.01	.01
F	Senecio multilobatus	$_{b}$24	$_{b}$7	$_{b}$12	$_{b}$21	$_{a}$-	.07	.07	-
F	Sphaeralcea coccinea	29	24	22	22	16	.30	.25	.05
F	Streptanthus cordatus	-	-	-	-	2	-	-	.00
F	Trifolium sp.	$_{a}$-	$_{a}$-	$_{a}$-	$_{b}$9	$_{a}$-	-	.07	-
F	Zigadenus paniculatus	-	-	-	-	1	-	-	.00
Total for Annual Forbs		0	0	45	58	196	0.12	0.19	0.66
Total for Perennial Forbs		135	141	132	150	53	1.10	0.81	0.23
Total for Forbs		135	141	177	208	249	1.22	1.00	0.90

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

BROWSE TRENDS --
Management unit 22 , Study no: 6

Type	Species	Strip Frequency			Average Cover %		
		'98	'03	'08	'98	'03	'08
B	Artemisia tridentata wyomingensis	90	88	91	13.81	17.86	16.60
B	Gutierrezia sarothrae	61	32	43	4.11	.36	.52
B	Juniperus osteosperma	3	3	0	.78	1.37	-
B	Pediocactus simpsonii	0	0	1	-	-	.00
B	Pinus edulis	1	2	3	.00	.00	.15
B	Purshia tridentata	30	23	23	3.14	4.05	1.07
B	Ribes cereum cereum	1	0	0	.00	-	-
Total for Browse		186	148	161	21.86	23.65	18.34

CANOPY COVER, LINE INTERCEPT --
Management unit 22 , Study no: 6

Species	Percent Cover		
	'98	'03	'08
Artemisia tridentata wyomingensis	-	18.85	23.06
Gutierrezia sarothrae	-	.10	.38
Juniperus osteosperma	.60	1.39	.93
Pinus edulis	-	-	.10
Purshia tridentata	-	2.83	1.48

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 22 , Study no: 6

Species	Average leader growth (in)	
	'03	'08
Artemisia tridentata wyomingensis	1.7	1.4
Purshia tridentata	2.7	1.8

POINT-QUARTER TREE DATA --
Management unit 22 , Study no: 6

Species	Trees per Acre		
	'98	'03	'08
Juniperus osteosperma	107	95	89

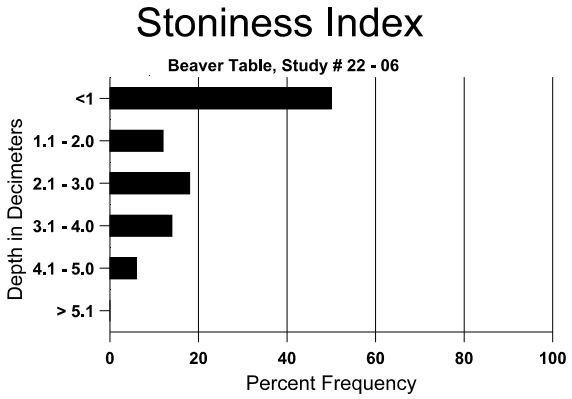
Average diameter (in)		
'98	'03	'08
5.0	4.6	6.5

BASIC COVER --
Management unit 22 , Study no: 6

Cover Type	Average Cover %				
	'85	'91	'98	'03	'08
Vegetation	6.50	5.25	41.77	28.00	24.79
Rock	14.50	10.25	9.70	8.77	7.01
Pavement	11.50	12.25	11.98	6.87	19.57
Litter	40.75	39.25	47.04	33.61	41.81
Cryptogams	.25	.75	.02	.81	.31
Bare Ground	26.50	32.25	18.15	37.97	22.12

SOIL ANALYSIS DATA --
Management unit 22, Study no: 6, Study Name: Beaver Table

Effective rooting depth (in)	Temp °F (depth)	pH	clay			%0M	PPM P	PPM K	ds/m
			%sand	%silt	%clay				
17.1	62.4 (16.5)	6.6	36.7	22.7	40.6	2.2	10.6	73.6	0.6



PELLET GROUP DATA --
Management unit 22 , Study no: 6

Type	Quadrat Frequency		
	'98	'03	'08
Rabbit	39	6	68
Elk	-	-	6
Deer	43	31	45
Cattle	-	-	1

Days use per acre (ha)		
'98	'03	'08
-	-	-
-	-	15 (36)
47 (116)	71 (175)	125 (308)
-	2 (5)	-

BROWSE CHARACTERISTICS --
Management unit 22 , Study no: 6

		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)
Artemisia tridentata wyomingensis												
85	**8331**	266	2133	3999	2199	-	49	2	26	.24	11	15/20
91	**9998**	-	399	4266	5333	-	33	19	53	2	16	17/26
98	**5420**	20	100	2740	2580	1380	43	8	48	12	13	19/26
03	**5740**	-	20	3940	1780	1180	49	8	31	7	7	20/26
08	**4720**	60	120	2500	2100	860	39	29	44	13	13	29/30
Gutierrezia sarothrae												
85	**7265**	2333	2799	4466	-	-	0	0	0	-	0	9/8
91	**1132**	-	66	733	333	-	0	0	29	2	6	9/6
98	**7640**	360	2400	5240	-	-	0	0	0	-	0	13/11
03	**1600**	60	420	1080	100	700	0	0	6	-	0	7/6
08	**2880**	60	120	2720	40	60	0	0	1	-	0	6/6
Juniperus osteosperma												
85	**199**	199	66	133	-	-	0	0	-	-	0	69/45
91	**199**	-	66	133	-	-	0	0	-	-	0	78/68
98	**60**	20	20	40	-	-	0	0	-	-	0	-/-
03	**60**	-	-	60	-	-	0	0	-	-	0	-/-
08	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Leptodactylon pungens												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	-	0	5/3
08	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Opuntia sp.												
85	**133**	-	-	133	-	-	0	0	0	-	0	5/12
91	**465**	-	333	66	66	-	14	14	14	4	43	4/6
98	**0**	-	-	-	-	-	0	0	0	-	0	7/19
03	**0**	-	-	-	-	-	0	0	0	-	0	6/9
08	**0**	-	-	-	-	-	0	0	0	-	0	6/13

		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)
Pediocactus simpsonii												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	-	0	-/-
08	**20**	-	20	-	-	-	0	0	-	-	0	1/1
Pinus edulis												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
98	**20**	20	20	-	-	-	0	0	-	-	0	-/-
03	**40**	-	40	-	-	-	0	0	-	-	0	-/-
08	**60**	-	20	40	-	-	0	0	-	-	0	-/-
Purshia tridentata												
85	**866**	-	133	733	-	-	38	62	0	-	0	22/11
91	**1265**	-	866	133	266	-	58	26	21	-	11	33/53
98	**780**	40	300	480	-	-	36	18	0	-	0	27/46
03	**600**	-	-	440	160	20	10	83	27	13	13	27/36
08	**740**	-	60	60	620	40	11	59	84	22	24	11/15
Ribes cereum cereum												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
98	**100**	-	-	100	-	-	0	0	-	-	0	12/16
03	**0**	-	-	-	-	-	0	0	-	-	0	-/-
08	**0**	-	-	-	-	-	0	0	-	-	0	-/-