

Trend Study 16B-18-04

Study site name: Porphyry Bench.

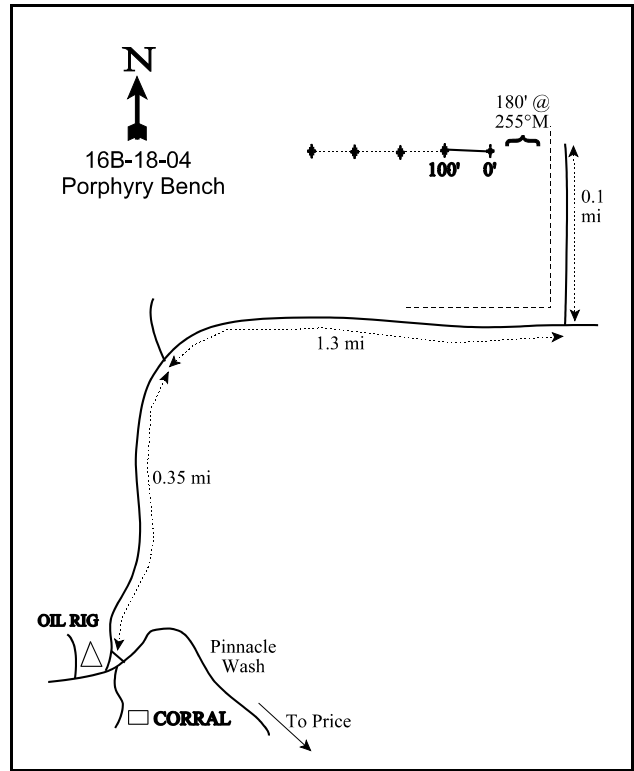
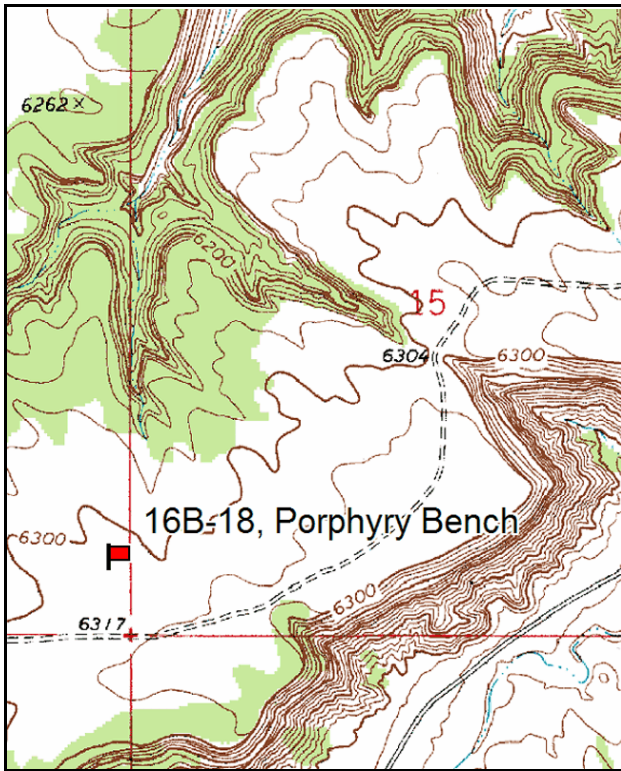
Vegetation type: Wyoming Big Sagebrush.

Compass bearing: frequency baseline 270 degrees magnetic.

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

LOCATION DESCRIPTION

Take Westwood Blvd (1550 W) northwest out of Price 2.35 miles to a major intersection. Turn left onto Gordon Creek Road and travel 0.45 miles to a fork. Bear left away from Gordon Creek, going 0.1 miles to a gravel pit. Continue 5.2 miles on the Pinnacle Peak Road to a 3-way fork at the top of the bench. Go right 0.35 miles to a fork. Bear right and continue 1.3 miles, going alongside a fence to the SE corner. Turn left and go along the fence 0.1 mile to the fifth wood post from the corner. Walk west into the sagebrush 180 feet to the 0-foot baseline stake. It is a 1 1/2 foot tall fencepost marked by browse tag #9021.



Map Name: Pinnacle Peak

Diagrammatic Sketch

Township 14S, Range 9E, Section 16

GPS: NAD 27, UTM 12S 4383382 N, 507731 E

DISCUSSION

Porphyry Bench - Trend Study No. 16B-18

The Porphyry Bench study site is located on critical deer winter range. The bench is largely a sagebrush/grass type, with juniper covered side hills and draws. The study is on a very gentle (1-2%) west-facing slope at an elevation of 6,300 feet. Located on a fenced 1/4 section of DWR land, the study site shows signs of heavy use. A nearby pellet group transect has had an average of 45 deer days use/acre between 1988 and 1994. Pellet group transect data from 1999 found high deer use with an estimated 149 deer days use/acre (369 ddu/ha). Deer use in 2004 was extremely high with an estimated 317 deer days use/acre (784 ddu/ha). Use by elk was light in 1999 with 1 elk day use/acre (3 edu/ha) and increased to 31 elk days use/acre (76 edu/ha) in 2004. In 1999, 4 cow days use/acre (9 cdu/ha) were estimated and no sign of cattle use was evident in 2004.

The soil appears to be moderately deep with an estimated effective rooting depth of just over 16 inches. A compacted layer is present at about 16 inches below the surface. Rock and pavement cover is nearly non-existent on the surface and very little is found in the profile. The soil has a loam texture with a moderately alkaline pH (8.1). Potassium is very low at 25.6 ppm. Values less than 70 ppm can effect plant development and growth. Surface erosion is minimal on the site due to the level topography and substantial vegetation and litter cover. Evidence of some pedestalling is apparent around the base of sagebrush stems and the larger bunch grasses. The ratio of bare ground to protective cover (vegetation, litter, and cryptogams) has dropped from 1:2.7 in 1999 to 1:2.2 in 2004. Relative percent bare ground during this same period increased from 28 to 39%.

Wyoming big sagebrush is the key species for this site. When this site was established in 1988, the Wyoming big sage population was characterized as being large and vigorous with good leader growth, with marginal seed production. The mature shrubs sampled in 1988 were heavily utilized with 48% of the shrubs displaying heavy hedging. Density was 6,933 plants/acre, 19% of which were young shrubs. Vigor was generally good, but 46% percent of the population was classified as decadent. By 1994, there was an estimated density of 6,200 plants/acre, most of which were mature (71%). Utilization was light and vigor had improved. Decadency also declined to 25%. In 1999, the population was estimated at 7,540 plants/acre, with 62% of these being mature plants. Very few seedlings were found, but recruitment was moderate with 10% of the population being classified as young. Decadency was at 28%, with very few plants displaying poor vigor. Deer use of the area greatly increased since the 1994 reading as evidenced by pellet group counts and the percentage of plants exhibiting heavy use (56%). In 2004, the density of Wyoming big sagebrush declined to 1,200 plants/acre, which is an 84% decrease. Drought conditions from 2001-2003 have had deleterious effects on this population. Annual precipitation has only been 48-60% of average during this time and spring conditions (April-June) have been very dry and were only 13% of normal in 2002. Cover decreased from 12% in 1999 to 1% in 2004. About 95% of the remaining population are classified as decadent and 87% of the plants were classified as dying. Surviving plants only have a few branches that have live growth. Leader growth is long (8.2 in) on live portions of plants and 88% percent of the population has been heavily utilized. Only 3% of the population was classified as young and very few seedlings were found. This population is in serious trouble and cannot support this level of use as it did in the past.

Clumps of brittle pricklypear cactus are very abundant. The cactus has been nearly as abundant as sagebrush over all sampling years in terms of strip frequency. In 2004, it had nearly 3% cover which made up 68% of the total browse cover. The density declined from 7,360 plants/acre in 1999 to 5,080 plants/acre in 2004, but only 13% of the population was considered decadent. This population is enduring the drought better than sagebrush. Brittle pricklypear spreads readily when the joints easily break off and then root. Winterfat was found in the vicinity, but is relatively uncommon.

The most abundant grass is needle-and-thread, which has had an average quadrat frequency of 91% during the first 3 sampling years (1988, 1994, and 1999). Cover provided by this species was high in 1994 at nearly 9%, increased to nearly 10% in 1999. In 2004, needle-and-thread was only found in 37% of quadrats and cover was down to less than 1%. In 1999, it made up 69% of the total grass cover and in 2004 it was 65% of the total grass cover. Western wheatgrass and Indian ricegrass have also decreased to less than 1% cover. Three forb species have increased to be the most dominant understory species in 2004. The annual forbs slimleaf goosefoot and groundsmoke increased to 7.0 and 1.8% cover respectively. The perennial scarlet globemallow did not increase significantly in abundance, but was very robust and increased from 1.6% cover in 1999 to 9.1% in 2004.

1994 TREND ASSESSMENT

Percent ground characteristics have improved on this site. Vegetation currently covers nearly 28% of the ground surface. Fifty-three percent of that cover comes from grasses and forbs. Litter cover has declined, but this trend is common during these dry years. Percent bare ground has also declined from 43% to 35%, and erosion is not currently a problem. The browse trend is currently stable. Decadency has declined from 46% to 25%. No seedlings were encountered in 1994 and young plants only make up almost 4% of the population. Reproductive potential will likely improve with normal precipitation patterns.

Sum of nested frequency for grasses and forbs have both increased indicating an improving trend. The most abundant grass, needle-and-thread, declined slightly in nested frequency while western wheatgrass and squirreltail both increased significantly. Perennial forbs are lacking on this site with only 5 species encountered in 1994. The only perennial forb that is very abundant is scarlet globemallow which makes up 81% of the forb cover. The Desirable Components Index (see methods) rating is good at 53. Sagebrush is abundant and health and perennial grasses are also abundant.

TREND ASSESSMENT

soil - up slightly (4)

browse - stable (3)

herbaceous understory - slightly up (4)

winter range condition (DC Index) - 53 (good) Wyoming big sagebrush type

1999 TREND ASSESSMENT

Trend for soil is stable. Percent cover from herbaceous vegetation increased while cover from litter and bare ground decreased. Erosion is minimal due to the gentle slope. Trend for browse is stable. Wyoming big sagebrush has a stable density with a moderate level of recruitment (10%). Decadency increased only slightly in 1999 to 28%. A major factor that will influence the condition of the sagebrush population in the future is the level of use, associated with drought. In 1994, no plants displayed heavy use, while 56% of the population were heavily browsed in 1999. If continued, this high level of use coupled with drought could cause a downward trend in the sagebrush on this critical winter range. Trend for the herbaceous understory is stable. Sum of nested frequency and cover for perennial species slightly increased since 1994. Annual species such as cheatgrass are still insignificant in the understory. The DCI score increased to 62 which is good to excellent. Sagebrush is healthy and abundant, while the herbaceous understory is very abundant.

TREND ASSESSMENT

soil - stable (3)

browse - stable (3)

herbaceous understory - stable (3)

winter range condition (DC Index) - 62 (good) Wyoming big sagebrush type

2004 TREND ASSESSMENT

Soil trend is slightly down. Protective cover from perennial grasses has decreased significantly. Forb cover is higher, but much of that is from annuals. Bare ground has increased. Trend for browse is down. Wyoming big sagebrush has declined dramatically. Drought in combination with heavy use could threaten this population. Decadency is at 95% for the population which has declined from 7,540 plants/acre in 1999 to 1,200 plants/acre in 2004. Recruitment is low and very few seedlings were observed in 2004. Hopefully improved weather patterns can improve enough for surviving plants to produce seed and for seedlings to be recruited into the population. Trend for herbaceous understory is down. Needle-and-thread nested frequency is down significantly and cover went from 10% in 1999 to 1% in 2004. Nested frequency of perennial grasses went from 431 in 1999 to 190 in 2004. Nested frequency for perennial forbs decreased from 223 in 1999 to 169 in 2004. Spring precipitation conditions must have been favorable for scarlet globemallow to increase in cover to 9%, but it was not significantly more abundant. Annual forbs have increased and now are significant on this site. The DCI score declined from good to excellent to very poor. Sagebrush die off and high decadence caused this decline.

TREND ASSESSMENT

soil - down slightly (2)

browse - down (1)

herbaceous understory - down (1)

winter range condition (DC Index) - 3 (very poor) Wyoming big sagebrush type

HERBACEOUS TRENDS --

Management unit 16B, Study no: 18

Type	Species	Nested Frequency				Average Cover %		
		'88	'94	'99	'04	'94	'99	'04
G	Agropyron smithii	a21	c91	bc84	ab52	.67	1.79	.26
G	Bouteloua gracilis	a1	ab8	b11	ab2	.06	.22	.01
G	Bromus tectorum (a)	-	3	-	-	.00	-	-
G	Oryzopsis hymenoides	59	40	67	59	1.26	2.12	.20
G	Sitanion hystrix	c43	c77	b13	a-	1.15	.28	-
G	Sporobolus cryptandrus	a3	b13	a-	a3	.39	-	.00
G	Stipa comata	b262	b250	b256	a74	8.67	9.88	.88
Total for Annual Grasses		0	3	0	0	0.00	0	0
Total for Perennial Grasses		389	479	431	190	12.24	14.31	1.36
Total for Grasses		389	482	431	190	12.24	14.31	1.36
F	Astragalus convallarius	10	-	4	4	-	.00	.07
F	Calochortus nuttallii	-	-	5	2	-	.03	.00
F	Castilleja spp.	-	-	2	-	-	.00	-
F	Chenopodium fremontii (a)	-	-	-	8	-	-	.07
F	Chenopodium leptophyllum(a)	-	b19	a-	c279	.03	-	7.03
F	Cruciferae	6	-	-	-	-	-	-
F	Descurainia pinnata (a)	-	a-	a-	b37	-	-	.16
F	Eriogonum alatum	-	-	2	-	-	.00	-

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'94	'99	'04	'94	'99	'04
F	<i>Eriogonum cernuum</i> (a)	-	8	-	3	.01	-	.03
F	<i>Gayophytum ramosissimum</i> (a)	-	a- 16	a- 9	b- 5	-	-	1.77
F	<i>Lappula occidentalis</i> (a)	-	b- 16	a- 9	c- 38	.05	-	.23
F	<i>Lesquerella</i> spp.	5	7	-	-	.01	-	-
F	<i>Lomatium</i> spp.	-	-	4	4	-	.01	.01
F	<i>Machaeranthera canescens</i>	2	-	-	-	-	-	-
F	<i>Orobanche</i> spp.	1	-	-	-	-	-	-
F	<i>Penstemon caespitosus</i>	1	-	-	-	-	.00	-
F	<i>Penstemon carnosus</i>	-	-	-	-	-	-	.00
F	<i>Phlox longifolia</i>	a- 4	a+ 4	b- 68	a- 13	.04	.32	.08
F	<i>Plantago patagonica</i> (a)	-	b- 37	a- 9	c- 53	.08	.01	.38
F	<i>Salsola iberica</i> (a)	-	a- 16	a- 16	b- 16	-	-	.37
F	<i>Schoenocrambe linifolia</i>	-	-	3	2	-	.00	.03
F	<i>Senecio multilobatus</i>	6	5	6	1	.01	.04	.00
F	<i>Sisymbrium altissimum</i> (a)	-	-	-	2	-	-	.03
F	<i>Sphaeralcea coccinea</i>	a- 94	ab- 125	ab- 126	b- 141	1.13	1.59	9.13
F	<i>Taraxacum officinale</i>	-	10	-	-	.01	-	-
F	<i>Tragopogon dubius</i>	3	-	-	-	-	-	-
F	<i>Zigadenus paniculatus</i>	-	-	3	2	-	.00	.00
Total for Annual Forbs		0	80	9	531	0.18	0.01	10.10
Total for Perennial Forbs		128	151	223	169	1.22	2.02	9.35
Total for Forbs		128	231	232	700	1.40	2.04	19.46

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

BROWSE TRENDS --

Management unit 16B, Study no: 18

T y p e	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	<i>Artemisia tridentata</i> <i>wyomingensis</i>	85	95	42	10.81	11.91	1.36
B	<i>Chrysothamnus viscidiflorus</i> <i>viscidiflorus</i>	0	4	1	-	.03	-
B	<i>Gutierrezia sarothrae</i>	3	11	0	.03	.10	-
B	<i>Opuntia fragilis</i>	93	93	80	2.96	3.74	2.83
Total for Browse		181	203	123	13.81	15.78	4.19

CANOPY COVER, LINE INTERCEPT --
Management unit 16B, Study no: 18

Species	Percent Cover '04
Artemisia tridentata wyomingensis	1.36
Opuntia fragilis	2.78

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 16B, Study no: 18

Species	Average leader growth (in) '04
Artemisia tridentata wyomingensis	3.2

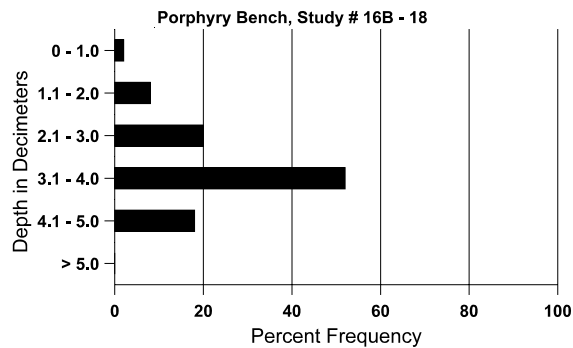
BASIC COVER --
Management unit 16B, Study no: 18

Cover Type	Average Cover %			
	'88	'94	'99	'04
Vegetation	5.50	27.77	31.73	26.38
Rock	0	.00	0	0
Pavement	0	.05	.00	.05
Litter	49.50	35.52	29.25	42.54
Cryptogams	2.25	.90	7.30	.72
Bare Ground	42.75	35.40	26.54	44.39

SOIL ANALYSIS DATA --
Management unit 16B, Study no: 18, Study Name: Porphyry Bench

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m
16.1	59.3 (18.1)	8.1	47.3	30.2	22.6	1.1	12.3	25.6	0.6

Stoniness Index



PELLET GROUP DATA --
 Management unit 16B, Study no: 18

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	21	32	19
Elk	11	2	4
Deer	52	79	67
Cattle	-	1	-

Days use per acre (ha)	
'99	'04
-	-
1 (3)	31 (76)
149 (369)	317 (784)
4 (9)	-

BROWSE CHARACTERISTICS --
 Management unit 16B, Study no: 18

		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>Artemisia tridentata wyomingensis</i>												
88	6933	66	1333	2400	3200	-	35	48	46	.86	13	17/21
94	6200	-	220	4420	1560	1360	2	0	25	6	6	17/24
99	7540	60	780	4640	2120	1740	31	56	28	7	7	16/24
04	1200	40	40	20	1140	5860	10	88	95	87	87	13/18
<i>Ceratoides lanata</i>												
88	199	-	66	133	-	-	33	33	-	-	0	15/8
94	0	-	-	-	-	-	0	0	-	-	0	-/-
99	0	-	-	-	-	-	0	0	-	-	0	-/-
04	0	-	-	-	-	-	0	0	-	-	0	12/11
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
94	0	-	-	-	-	-	0	0	-	-	0	-/-
99	100	-	-	100	-	-	0	0	-	-	0	4/10
04	40	-	-	40	-	-	0	0	-	-	0	8/8
<i>Gutierrezia sarothrae</i>												
88	1066	-	266	800	-	-	0	0	-	-	0	8/4
94	80	-	-	80	-	-	0	0	-	-	0	6/7
99	1040	-	560	480	-	-	0	0	-	-	0	3/5
04	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Opuntia fragilis</i>												
88	8133	266	3533	4200	400	-	0	0	5	-	4	3/9
94	6960	-	60	6840	60	-	0	0	1	-	0	3/12
99	7360	20	280	6320	760	40	0	0	10	7	15	3/12
04	5080	-	80	4320	680	100	0	0	13	6	6	4/13