

Trend Study 20-6-08

Study site name: Wah Wah Pass .

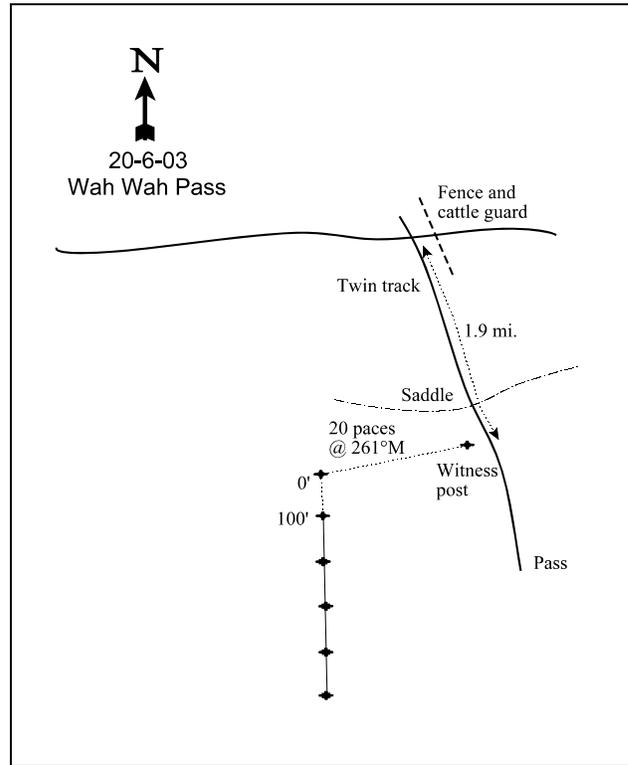
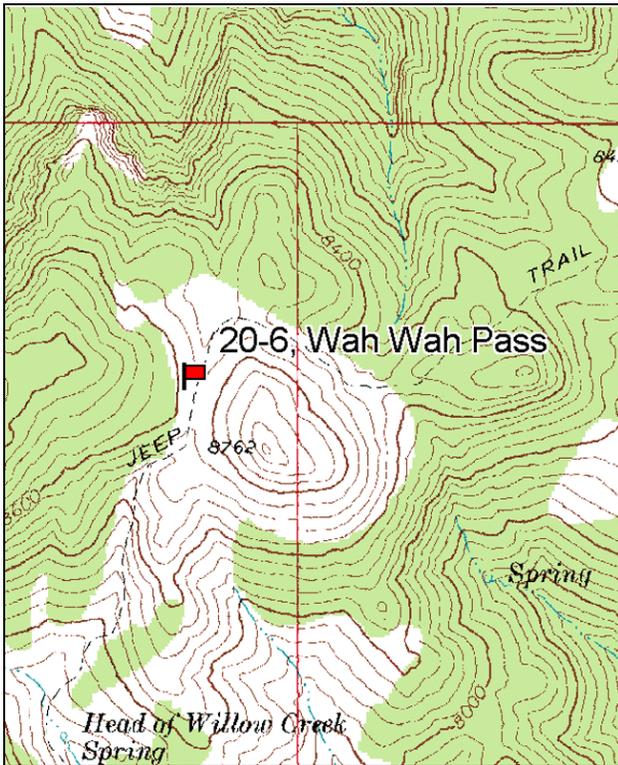
Vegetation type: Curleaf Mtn Mahogany .

Compass bearing: frequency baseline 184 degrees magnetic.

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

LOCATION DESCRIPTION

From the Indian Peaks cabin turnoff from the Pine Valley Road, go north 3.5 miles through an “S” turn in the road, crossing a gully to a fork. Turn right and travel east 1.45 miles to a cattleguard. Continue about 7.1 miles up the canyon to the pass. Turn right before a fence and another cattleguard on a twin track. Travel south about 1.9 miles to a saddle and a witness post on the right side of the road. From the post, the 0-foot stake is 20 paces at a bearing of 261 degrees magnetic.



Map Name: Lamerdorf Peak

Diagrammatic Sketch

Township 29S, Range 19W, Section 2

GPS: NAD 83, UTM 12S 272424 E, 4244446 N

DISCUSSION

Wah Wah Pass - Trend Study No. 20-6

Study Information

This study was established in 1998 to monitor wildlife use on the Wah Wah Mountains [elevation: 8,620 feet (2,627 m), slope: 5%-20%, aspect: east]. The Lamerdorf wildfire burned the slope to the east of the study in July of 2000. The area is considered high-elevation winter range for deer, which is likely used year round with mild weather conditions, however, no trend studies were previously established on these mountains because of low deer numbers. The study is also used by elk, cattle, and wild horses. Pellet group transect data estimated deer use at 11 days use/acre (27 ddu/ha) in 1998, 21 days use/acre (53 ddu/ha) in 2003, and 55 days use/acre (137 ddu/ha) in 2008. Deer use was more prevalent at the southern end of the baseline, which is surrounded by dense curleaf mountain mahogany (*Cercocarpus ledifolius*). Elk use was estimated at 14 days use/acre (35 edu/ha) in 2003 and 22 days use/acre (55 edu/ha) in 2008. Cattle use was estimated at 18 days use/acre (46 cdu/ha) in 1998 and 2003, and 9 days use/acre (23 cdu/ha) in 2008. Cattle were observed when the study was established in 1998, using the shade provided by the taller mountain mahogany. They had utilized the available grasses prior to the 1998 sampling. In 2008, a cow carcass was found on the study, and another skeleton was found just east of the study. Wild horses were also seen near the study in 1998 and 2003, and a horse hoof was found on the study in 2008. Horse use was estimated at 3 days use/acre (9 hdu/ha) in 1998, 10 days use/acre (24 hdu/ha) in 2003, and 2 days use/acre (6 hdu/ha) in 2008. Most of the cattle and horse use was concentrated near the northern end of the baseline near an open meadow.

Soil

The soil is a clay loam with a neutral reaction (pH 6.8). Soil phosphorus is low at 2.6 ppm (Tiedemann and Lopez 2004). The soil surface is fairly rocky, with pavement and rock concentrated in the open interspaces. Relative combined rock and pavement cover was 10%-11% in all sample years, while relative combined vegetation and litter cover was 79%-85%. The soil erosion condition was classified as stable in 2003 and 2008.

Browse

The vegetation community consists primarily of an overstory of curleaf mountain mahogany with a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and mountain snowberry (*Symphoricarpos oreophilus*) understory. Mountain mahogany canopy cover increased from 51% in 1998 to 56% in 2003, then decreased to 46% in 2008. Density has ranged from 1,000 plants/acre to 1,500 plants/acre. The population has been composed of mostly mature plants. Decadence increased from 3% in 1998 to 17% in 2003, then decreased to 10% in 2008. Young recruitment decreased from 36% in 1998 to 19% in 2003 and 16% in 2008. Seedling density decreased from 3,960 plants/acre in 1998 to 80 plants/acre in 2008. Vigor was good on most plants in 1998 and 2008, and 16% of the population displayed poor vigor in 2003. Browse use was light-moderate in 1998, varied from light to heavy in 2003, and was mostly light with some heavy use in 2008. Annual leader growth averaged 3.3 inches (8.4 cm) in 2003 and 1.3 inches (3.3 cm) in 2008.

Mountain big sagebrush quadrat cover decreased from 6% in 1998 to 4% in 2003 and 2008. Density has ranged between 2,180 plants/acre and 4,100 plants/acre since 1998. Decadence steadily decreased from 26% of the population in 1998 to 4% in 2008. Young recruitment increased from 17% of the population in 1998 to 51% in 2003, then decreased to 27% in 2008. Vigor has improved from 10% of the population displaying poor vigor in 1998 to 2% in 2003 and 2008. Browse use was mostly light in 1998 and 2003, and light-moderate in 2008. Average annual leader growth was 0.9 inches (2.3 cm) in 2003 and 1.4 inches (3.5 cm) in 2008.

Mountain snowberry quadrat cover has ranged from 13% to 15% since 1998, and density has ranged between 4,600 plants/acre and 5,840 plants/acre. There are also small populations of wax currant (*Ribes cereum* ssp.

cereum) and slenderbush eriogonum (*Eriogonum microthecum*) on the study, which produce little cover. Singleleaf pinyon pine (*Pinus monophylla*) and white fir (*Abies concolor*) trees have provided 2%-5% combined canopy cover since 1998.

Herbaceous Understory

The herbaceous understory is diverse but provides little cover. Total grass cover was 2% in 1998 and 2008 and less than 1% in 2003. Mutton bluegrass (*Poa fendleriana*) has provided the majority of the grass cover in all sample years. Other perennial grass species present include bluebunch wheatgrass (*Agropyron spicatum*), Indian ricegrass (*Oryzopsis hymenoides*), sedge (*Carex sp.*), and bottlebrush squirreltail (*Sitanion hystris*). Cheatgrass (*Bromus tectorum*) was sampled at a quadrat frequency of 2% in 2003 and 1% in 2008.

Total forb cover was 7% in 1998, 3% in 2003, and 5% in 2008. Forbs are diverse, but no species are particularly abundant. Some of the more common species include false dandelion (*Agoseris glauca*), thistle (*Cirsium sp.*), Eaton fleabane (*Erigeron eatonii*), and lousewort (*Pedicularis centranthera*).

1998 Desirable Components Index

The 1998 winter range condition, determined by the Desirable Components Index (DCI), was rated as fair-good due to high preferred browse cover with low decadence and high young recruitment, high perennial forb cover, and low perennial grass cover.

winter range condition (DCI) - fair-good (72) High potential scale

2003 Trend Assessment

The browse trend is slightly up. Curlleaf mountain mahogany density increased slightly, and young recruitment remained favorable, although it decreased from 36% of the population to 19%. Decadence increased from 3% of the population to 17%. Mountain big sagebrush density increased 88%, and decadence decreased from 26% of the population to 13%. Young recruitment increased substantially from 17% of the population to 51%. The trend for grass is stable. The sum of nested frequency for perennial grasses changed little. The trend for forbs is down. The sum of nested frequency for perennial forbs decreased 50%. False dandelion, Hooker balsamroot (*Balsamorhiza hookeri*), twinpod (*Physaria chambersii*), and thistle decreased significantly in nested frequency. The 2003 DCI was rated as poor-fair due to decreases in preferred browse, perennial grass, and perennial forb cover.

winter range condition (DCI) - poor-fair (55) High potential scale

browse - slightly up (+1) grass - stable (0) forb - down (-2)

2008 Trend Assessment

The browse trend is slightly down. Curlleaf mountain mahogany density decreased 33%, and young recruitment remained high at 16% of the population. Decadence decreased from 17% of the population to 10%, and vigor improved from 16% of the population displaying poor vigor to 4%. Mountain big sagebrush density decreased 13%, and young recruitment remained favorable, although it decreased from 51% of the population to 27%. Decadence decreased from 13% of the population to 4%, and vigor remained good. The trend for grass is stable. The sum of nested frequency for perennial grasses increased slightly. The trend for forbs is slightly up. The sum of nested frequency for perennial forbs increased 46%. Seego lily (*Calochortus nuttallii*) increased significantly in nested frequency. The DCI rating declined to poor due to decreases in preferred browse cover and young recruitment, despite increases in perennial grass and forb cover.

winter range condition (DCI) - poor (51) High potential scale

browse - slightly down (-1) grass - stable (0) forb - slightly up (+1)

HERBACEOUS TRENDS --
Management unit 20 , Study no: 6

T y p e	Species	Nested Frequency			Average Cover %		
		'98	'03	'08	'98	'03	'08
G	Agropyron spicatum	a7	ab12	b25	.03	.04	.70
G	Bromus tectorum (a)	-	3	1	-	.01	.00
G	Carex sp.	-	3	7	-	.15	.04
G	Oryzopsis hymenoides	3	3	5	.01	.01	.21
G	Poa fendleriana	65	50	56	2.16	.40	.88
G	Poa pratensis	-	-	1	-	-	.03
G	Sitanion hystrix	-	2	1	-	.01	.00
G	Stipa columbiana	-	-	3	-	-	.04
Total for Annual Grasses		0	3	1	0	0.00	0.00
Total for Perennial Grasses		75	70	98	2.21	0.61	1.90
Total for Grasses		75	73	99	2.21	0.62	1.91
F	Agoseris glauca	b37	a14	ab28	.73	.03	.58
F	Balsamorhiza hookeri	7	1	-	.60	.03	-
F	Balsamorhiza sagittata	2	-	2	.15	-	.03
F	Calochortus nuttallii	ab11	a2	b18	.05	.00	.07
F	Chaenactis douglasii	9	5	-	.21	.01	-
F	Chenopodium fremontii (a)	a-	b14	a3	-	.08	.01
F	Cirsium sp.	b43	a15	ab24	.70	.26	.45
F	Cryptantha sp.	5	5	4	.03	.03	.04
F	Cymopterus sp.	1	-	4	.00	-	.00
F	Erigeron eatonii	33	27	35	.40	.22	.72
F	Eriogonum spathulatum	3	6	-	.15	.16	-
F	Gayophytum ramosissimum(a)	-	1	-	-	.00	-
F	Ipomopsis aggregata	6	3	3	.04	.00	.00
F	Lappula occidentalis (a)	14	3	6	.08	.01	.01
F	Linum lewisii	9	-	6	.23	-	.18
F	Lithospermum ruderales	-	-	3	-	-	.03
F	Lupinus argenteus	18	6	13	.43	.23	.39
F	Machaeranthera canescens	2	1	-	.03	.00	-
F	Mertensia arizonica leonardi	3	-	-	.15	-	-
F	Medicago sativa	4	-	-	.38	-	-
F	Pedicularis centranthera	21	16	24	.70	.62	.97
F	Penstemon comarrhenus	b13	a-	a1	.28	.01	.15
F	Penstemon palmeri	a-	b23	a-	-	.58	-

Type	Species	Nested Frequency			Average Cover %		
		'98	'03	'08	'98	'03	'08
		F	Penstemon pachyphyllus	_b 13	_a -	_b 10	.10
F	Petradoria pumila	14	11	22	.37	.24	.80
F	Physaria chambersii	_b 19	_a 2	_a 5	.58	.00	.01
F	Polygonum douglasii (a)	_a -	_a 7	_b 25	-	.01	.31
F	Senecio multilobatus	6	3	-	.06	.00	-
F	Taraxacum officinale	3	-	2	.03	-	.15
F	Veronica biloba (a)	-	-	1	-	-	.00
Total for Annual Forbs		14	25	35	0.07	0.12	0.34
Total for Perennial Forbs		282	140	204	6.47	2.47	4.83
Total for Forbs		296	165	239	6.55	2.59	5.18

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

BROWSE TRENDS --

Management unit 20 , Study no: 6

Type	Species	Strip Frequency			Average Cover %		
		'98	'03	'08	'98	'03	'08
		B	Abies concolor	0	3	1	.15
B	Artemisia tridentata vaseyana	40	37	37	6.40	4.03	4.38
B	Cercocarpus ledifolius	39	41	32	27.11	13.33	5.84
B	Chrysothamnus parryi	0	7	10	-	.59	.69
B	Chrysothamnus viscidiflorus viscidiflorus	22	4	6	1.19	.30	.04
B	Eriogonum microthecum	0	0	3	-	-	.06
B	Gutierrezia sarothrae	0	28	31	-	1.13	1.95
B	Juniperus osteosperma	0	0	0	.38	.63	-
B	Leptodactylon pungens	0	1	0	-	.00	-
B	Mahonia repens	18	16	19	2.09	1.36	1.95
B	Pinus monophylla	2	2	2	.00	.03	.18
B	Ribes cereum cereum	1	1	1	.63	.15	.38
B	Symphoricarpos oreophilus	54	56	59	14.33	13.00	15.11
B	Tetradymia canescens	0	0	2	-	-	.00
Total for Browse		176	196	203	52.30	34.60	30.76

CANOPY COVER, LINE INTERCEPT --
 Management unit 20 , Study no: 6

Species	Percent Cover		
	'98	'03	'08
Abies concolor	2.00	.98	1.79
Artemisia tridentata vaseyana	-	4.80	4.90
Cercocarpus ledifolius	50.79	56.43	46.08
Chrysothamnus parryi	-	.23	.10
Chrysothamnus viscidiflorus viscidiflorus	-	-	.30
Eriogonum microthecum	-	-	.10
Gutierrezia sarothrae	-	1.95	2.38
Juniperus osteosperma	-	.80	-
Mahonia repens	-	1.28	1.79
Pinus monophylla	3.40	.60	.66
Ribes cereum cereum	-	.11	.01
Symphoricarpos oreophilus	-	16.14	23.10
Tetradymia canescens	-	-	.03

KEY BROWSE ANNUAL LEADER GROWTH --
 Management unit 20 , Study no: 6

Species	Average leader growth (in)	
	'03	'08
Artemisia tridentata vaseyana	0.9	1.4
Cercocarpus ledifolius	3.3	1.3

POINT-QUARTER TREE DATA --
 Management unit 20 , Study no: 6

Species	Trees per Acre		
	'98	'03	'08
Cercocarpus ledifolius	240	312	268

Average diameter (in)		
'98	'03	'08
8.0	8.9	13.5

BASIC COVER --

Management unit 20 , Study no: 6

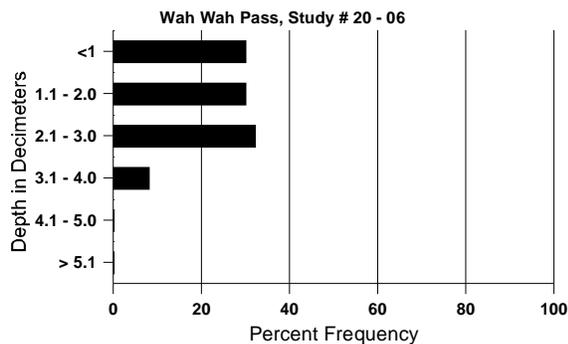
Cover Type	Average Cover %		
	'98	'03	'08
Vegetation	49.24	36.05	35.69
Rock	7.25	7.03	7.14
Pavement	8.96	4.26	5.28
Litter	74.97	65.70	57.98
Cryptogams	.00	0	.03
Bare Ground	7.97	6.56	12.87

SOIL ANALYSIS DATA --

Management unit 20, Study no: 6, Study Name: Wah Wah Pass

Effective rooting depth (in)	Temp °F (depth)	pH	Clay Loam			%0M	PPM P	PPM K	ds/m
			%sand	%silt	%clay				
15.2	55.0 (13.0)	6.8	29.6	34.8	35.6	4.9	2.6	195.2	0.7

Stoniness Index



PELLET GROUP DATA --

Management unit 20 , Study no: 6

Type	Quadrat Frequency		
	'98	'03	'08
Rabbit	9	6	32
Horse	2	9	5
Elk	-	1	7
Deer	9	7	17
Cattle	8	5	18

Days use per acre (ha)		
'98	'03	'08
-	-	-
3 (9)	10 (24)	2 (6)
-	14 (35)	22 (55)
11 (26)	21 (53)	55 (137)
3 (9)	19 (47)	9 (23)

BROWSE CHARACTERISTICS --
Management unit 20 , 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)
<i>Abies concolor</i>												
98	0	-	-	-	-	-	0	0	-	-	0	-/-
03	60	-	60	-	-	-	0	0	-	-	0	-/-
08	20	40	20	-	-	-	0	0	-	-	0	-/-
<i>Artemisia tridentata vaseyana</i>												
98	2180	220	380	1240	560	180	0	0	26	10	10	11/20
03	4100	240	2100	1480	520	280	5	.48	13	2	2	10/18
08	3580	560	960	2480	140	-	56	0	4	2	2	11/22
<i>Cercocarpus ledifolius</i>												
98	1440	3960	520	880	40	100	32	4	3	1	1	68/102
03	1500	400	280	960	260	340	45	24	17	8	16	59/60
08	1000	80	160	740	100	360	6	22	10	4	4	-/-
<i>Chrysothamnus parryi</i>												
98	0	-	-	-	-	-	0	0	0	-	0	-/-
03	460	-	140	280	40	-	61	13	9	-	0	8/11
08	420	40	100	320	-	-	0	0	0	-	0	8/13
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
98	860	20	100	700	60	20	0	0	7	5	5	6/10
03	200	-	60	120	20	-	0	0	10	-	0	11/14
08	260	-	-	260	-	-	0	0	0	-	0	7/12
<i>Eriogonum microthecum</i>												
98	0	-	-	-	-	-	0	0	0	-	0	-/-
03	0	-	-	-	-	-	0	0	0	-	0	-/-
08	80	20	-	60	20	-	0	0	25	25	25	5/7
<i>Gutierrezia sarothrae</i>												
98	0	-	-	-	-	-	0	0	0	-	0	9/14
03	2780	-	100	2660	20	120	0	0	1	-	0	8/9
08	3760	320	1000	2460	300	60	0	0	8	7	7	6/9
<i>Leptodactylon pungens</i>												
98	0	-	-	-	-	-	0	0	-	-	0	-/-
03	380	-	-	380	-	-	0	0	-	-	0	-/-
08	0	-	-	-	-	-	0	0	-	-	0	-/-

		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)
Mahonia repens												
98	4800	60	1140	3660	-	-	0	0	0	-	0	4/7
03	9500	-	-	9460	40	-	0	0	0	-	.42	3/5
08	16060	980	2260	13480	320	420	0	0	2	.37	.37	3/5
Opuntia sp.												
98	0	-	-	-	-	-	0	0	-	-	0	3/9
03	0	-	-	-	-	-	0	0	-	-	0	3/7
08	0	-	-	-	-	-	0	0	-	-	0	4/11
Pinus monophylla												
98	40	80	20	20	-	-	0	0	-	-	0	-/-
03	80	60	60	20	-	-	0	0	-	-	0	-/-
08	40	80	20	20	-	-	0	0	-	-	0	-/-
Ribes cereum cereum												
98	20	-	-	-	20	-	100	0	100	-	0	25/27
03	20	-	-	20	-	-	0	0	0	-	0	30/40
08	20	-	-	20	-	-	0	0	0	-	0	31/45
Symphoricarpos oreophilus												
98	5000	20	780	3900	320	-	5	0	6	.40	.40	13/27
03	4600	-	140	4220	240	20	6	2	5	2	3	11/26
08	5840	60	1340	4460	40	80	3	2	1	-	0	13/29
Tetradymia canescens												
98	0	-	-	-	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	10/26
08	40	-	-	40	-	-	0	0	-	-	0	9/13