Trend Study14-12-04

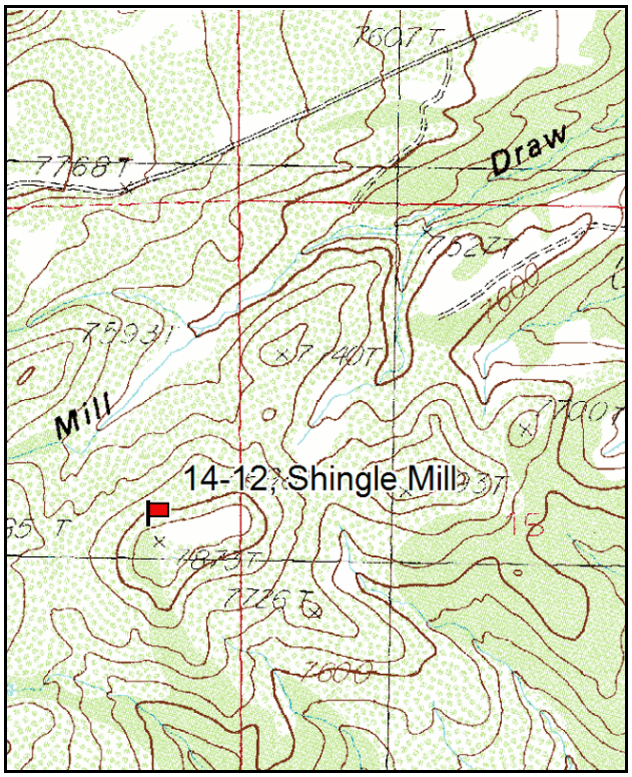
Study site name: Shingle Mill . Vegetation type: Mixed Oak-Mtn Brush .

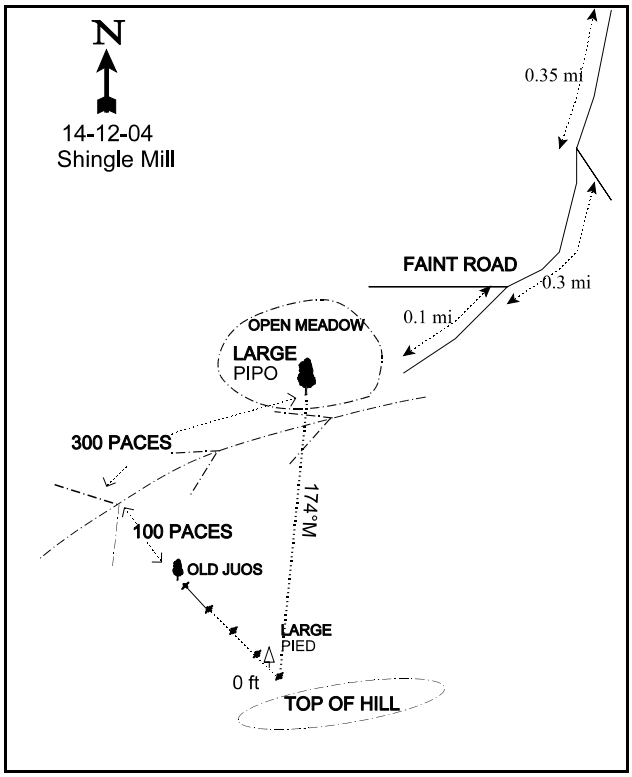
Compass bearing: frequency baseline 278 degrees magnetic.

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

LOCATION DESCRIPTION

On Forest Service Road #79 go 3.5 miles from the junction of Blue Mountain and South Creek Roads. Turn left on Forest Service Road #261 and continue 0.35 miles to a fork. Turn right on a faint road and go 0.3 miles to a fork. Bear left for 0.1 miles to a large ponderosa pine in a flat. Park here and take a bearing of 174°M. The site is on a hillside about ½ mile away. The 0 foot stake is uphill, with the baseline running down at 278°M.





Map name: Abajo Peak

Diagrammatic Sketch

Township 34S , Range 23E , Section 16 .

GPS: NAD 27, UTM 12S 4187069 N, 641389 E

DISCUSSION

Shingle Mill - Trend Study No. 14-12

The Shingle Mill trend study was established in 1994. It samples a mixed mountain brush type west of Monticello, considered critical deer winter range by Forest Service personnel. This site is similar to site 14-3 (Gold Queen Basin), but more open with scattered Ponderosa pine and oak with mixed mountain browse on a moderate slope (25-30%) and a south to east aspect. The elevation of the site is 7,500 feet. The area is grazed as part of the Lakes allotment. It is grazed by 241 head of cattle from July 1 to October 15. There was some elk use on the site, but deer use was about three times that of elk. Pellet group data from 1999 estimated 40 deer days use/acre (99 ddu/ha), 7 elk days use/acre (17 edu/ha), and 9 cow use days/acre (22 cdu/ha). Much of the deer and elk sign was recent, while the cow pats appeared to be mostly from the previous grazing season. Pellet group data from 2004 estimated 54 deer and 19 elk days use/acre (134 ddu/ha and 46 edu/ha). A few deer were seen near the site during the 2004 reading and recent pellet groups suggest that the site is used year round until snow depth force deer to lower elevations in the winter.

The soil on the site is deep with an effective rooting depth estimated at nearly 19 inches. There is also a high amount of large rock on the surface and within the top 4 inches of the soil profile. Texture of the soil is a clay with a neutral pH (7.3). Parent material appears to be granite, but there is also some shale present on the site. There has been great deal of erosion in the past as evidenced by the large gullies in the bottom of the drainage. There is some soil pedestaling evident on the site, but overall erosion on the slope appears minimal.

The site supports several useful and preferred browse species including the following: serviceberry, mountain big sagebrush, true mountain mahogany, and squaw-apple. Other species present include black sagebrush, dwarf rabbitbrush, Gambel oak, and snowberry. Mountain big sagebrush, true mountain mahogany, and squaw-apple are the key species on the site. They contribute nearly one-half of the shrub cover and show moderate to heavy use. There is a mix of mountain big sagebrush and black sagebrush on the slope and likely some hybrids. Black sagebrush occurs on the steeper portions of the slope in isolated patches of more shallow soil. Mountain big sagebrush has a stable density of around 2,500 plants/acre. Use was light in 1994 and 1999 and vigor normal on most plants. During the 2004 reading use was more moderate and the number of decadent plants increased to 36%. Approximately 20% of sagebrush was classified as dying. Young recruitment was poor but seedlings were very abundant.

True mountain mahogany had a density of 940 plants/acre in 2004. Use was moderate to heavy in 1994 and 1999 but heavy in 2004. Vigor is generally good and decadence is low. Squaw-apple has a density of about 1,000 plants/acre. Mature plants average only about 2 feet in height with a crown diameter of just under 3 feet. Utilization has been moderate to heavy during all readings, although vigor is normal on most plants. Drought conditions in 2004 have caused the number of decadent squaw-apple to increase to 34%. Young recruitment has steadily declined since 1994 with only one young plant sampled in 2004. Serviceberry numbered about 850 plants/acre in 1994 and 1999. Density declined 52% in 2004 to only 400 plants/acre. Mature plants are small averaging only 15 inches in height with many growing under other shrubs making much of the plant unavailable to browsing. Use on available portions has been moderate to heavy especially in 2004.
Some Gambel oak occurs in isolated clones near the top of the ridge. Some plants are tall and partly unavailable with use concentrated along the edges. Dwarf rabbitbrush and snowberry are abundant and mostly unutilized. They both have low decadence and show normal vigor.

The herbaceous understory is diverse and abundant providing half of the vegetation cover on the site in 1999. Grasses are diverse with 10 species sampled on the site. Mutton bluegrass is most abundant followed by prairie junegrass, subalpine needlegrass, and bottlebrush squirreltail. Mutton bluegrass provided about 43% of the total grass cover in 1994 and 1999 increasing to 72% in 2004. Drought conditions caused several perennial grasses to decline in frequency in 2004. Forbs are also diverse with 20 species encountered in 1999 and 25 in 2004. Most species are uncommon however, with three species, weedy milkvetch, silvery lupine, and mat penstemon,

providing about 92% of the forb cover in 1994 and 1999.

1994 APPARENT TREND ASSESSMENT

The soil appears well protected and erosion is minimal. The preferred browse species, serviceberry, mountain big sagebrush, true mountain mahogany, and squaw-apple, are moderately to heavily utilized, although generally in good vigor with low decadence. The herbaceous understory is abundant and diverse. Mutton bluegrass is most abundant, providing 45% of the grass cover. Carex, prairie junegrass, and subalpine needlegrass are also abundant. The forb composition is poor however, with three species, weedy milkvetch, silvery lupine and mat penstemon, providing 91% of the forb cover. Weedy milkvetch and silvery lupine are poisonous to livestock. Trend indicators in the future will depend on how these species change in frequency. The Desirable Components Index (see methods) rating is fair to good at 67 for a mountain brush community. The amount of perennial grasses is low for a mountain brush type and the proportion of young browse plants was also low.

winter range condition (DC Index) - 67 (fair to good) Mountain brush type

1999 TREND ASSESSMENT

Trend for soil is stable with similar relative percent cover values for bare ground. Litter cover increased slightly, while rock and pavement cover remained similar. There is some evidence of erosion on the site, yet it appears localized. Trend for the key browse species, mountain big sagebrush, true mountain mahogany, and squaw-apple appear stable. Utilization is moderate to heavy but vigor is generally good with percent decadence low. Trend for the herbaceous understory is slightly up with an increase in the sum of nested frequency of grasses and forbs. Composition of forbs is still undesirable however. Nested frequency of slender wheatgrass, prairie Junegrass, Kentucky bluegrass, and subalpine needlegrass increased significantly. Frequency of silvery lupine also increased significantly, although both weedy milkvetch and mat penstemon increased, but not significantly. Cover of both grasses and forbs doubled since 1994. The DCI score improved to 90 as preferred browse, decadence, proportion of young browse, and perennial grass cover all improved.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - slightly up (4)
winter range condition (DC Index) - 90 (good to excellant) Mountain brush type

2004 TREND ASSESSMENT

Trend for soil is stable with similar relative percent cover values for litter and vegetation. Percent cover of bare ground declined slightly. There is some isolated erosion occurring on the slope but it is minimal and localized. The erosion condition class determined soil to be stable. Trend for the key browse species, mountain big sagebrush, true mountain mahogany, and squaw-apple is stable but these species appear to be suffering the effects of drought. Density of mountain big sagebrush declined slightly while true mountain mahogany and squaw-apple increased slightly. The number of mountain big sagebrush displaying poor vigor increased from 2% to 20% and the proportion of the population classified as decadent increased from 12% to 36%. Squaw-apple also displayed an increase in poor vigor and decadence but true mountain mahogany's average vigor and decadence remained similar to 1999 estimates. Utilization was heavier on all key species but annual leader growth was good. Young recruitment was poor for squaw-apple and mountain big sagebrush but remained good for mahogany. Seedlings were very abundant for sagebrush. Trend for the herbaceous understory is down. Sum of nested frequency for perennial grasses declined 42% and frequency of forbs

dropped 32% since 1999. Western wheatgrass, slender wheatgrass, Carex spp., Kentucky bluegrass, and subalpine needlegrass declined significantly in nested frequency. Cover of perennial grasses dropped by nearly 50%. The forb composition is still dominated by weedy milkvetch, silvery lupine, and mat penstemon. All of these species declined in nested frequency and total cover of perennial forbs declined 66%. The DCI score declined to 60 (fair) due to declines in each category. Preferred browse cover is lower, decadence up, proportion of young browse plants declined, and cover of perennial grasses and forbs is also lower.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - down (1)
winter range condition (DC Index) - 60 (fair) Mountain brush type

HERBACEOUS TRENDS --
Management unit 14 , Study no: 12

Type	Species	Nested Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
G	Agropyron smithii	$_{ab}$5	$_{b}$20	$_{a}$3	.01	.12	.03
G	Agropyron trachycaulum	$_{b}$40	$_{b}$57	$_{a}$16	.82	.75	.36
G	Carex spp.	$_{b}$23	$_{b}$33	$_{a}$3	1.23	.93	.00
G	Koeleria cristata	33	82	56	.51	3.25	.88
G	Oryzopsis hymenoides	13	9	14	.09	.01	.13
G	Poa fendleriana	241	254	204	3.86	6.80	6.36
G	Poa pratensis	$_{a}$7	$_{b}$43	$_{a}$-	.16	1.04	-
G	Sitanion hystrix	$_{b}$91	$_{a}$29	$_{a}$41	.72	.46	.68
G	Stipa columbiana	$_{a}$17	$_{b}$104	$_{a}$25	.52	3.16	.37
G	Stipa comata	-	6	3	-	.06	.01
G	Stipa lettermani	$_{b}$35	$_{a}$-	$_{a}$3	.66	-	.03
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		505	637	368	8.59	16.62	8.88
Total for Grasses		505	637	368	8.59	16.62	8.88
F	Achillea millefolium	$_{b}$24	$_{b}$20	$_{a}$-	.22	.57	-
F	Agoseris glauca	4	-	1	.01	-	.01
F	Agastache urticifolia	-	-	7	-	-	.02
F	Allium spp.	7	-	10	.02	-	.02
F	Arabis spp.	$_{a}$4	$_{a}$-	$_{b}$8	.01	-	.02
F	Arenaria fendleri	-	-	1	-	-	.00
F	Artemisia ludoviciana	10	3	-	.01	.03	-
F	Astragalus miser	$_{b}$154	$_{b}$207	$_{a}$97	5.65	13.08	3.05
F	Castilleja linariaefolia	5	4	-	.03	.03	-
F	Calochortus nuttallii	$_{a}$2	$_{b}$13	$_{a}$3	.00	.31	.01

Type	Species	Nested Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
F	Cirsium spp.	4	1	-	.01	.00	-
F	Crepis acuminata	2	13	7	.00	.08	.05
F	Cymopterus spp.	1	3	-	.00	.00	-
F	Erigeron eatonii	-	-	1	-	-	.03
F	Eriogonum elatum	2	-	-	.00	-	-
F	Erigeron flagellaris	4	4	3	.01	.03	.03
F	Hymenoxys acaulis	$_{ab}$9	$_{b}$13	$_{a}$4	.09	.05	.03
F	Lathyrus lanszwertii	4	-	-	.00	-	-
F	Lappula occidentalis (a)	$_{a}$-	$_{a}$-	$_{b}$22	-	-	.93
F	Lactuca serriola	-	-	3	-	-	.03
F	Lomatium dissectum	14	25	18	.17	.21	.13
F	Lupinus argenteus	$_{a}$39	$_{b}$46	$_{a}$42	1.99	3.58	1.02
F	Penstemon caespitosus	$_{b}$144	$_{ab}$165	$_{a}$106	2.26	4.53	1.79
F	Penstemon pachyphyllus	3	-	2	.01	-	.03
F	Petradoria pumila	-	7	2	-	.09	.01
F	Phlox hoodii	-	-	3	-	-	.00
F	Phlox longifolia	$_{a}$72	$_{a}$52	$_{b}$95	.19	.16	.46
F	Polygonum douglasii (a)	-	-	1	-	-	.00
F	Senecio neomexicanus	3	1	-	.00	.00	-
F	Taraxacum officinale	$_{a}$-	$_{b}$28	$_{a}$1	-	.14	.00
F	Tragopogon dubius	3	2	1	.00	.01	.00
F	Trifolium gymnocarpon	1	3	4	.03	.00	.01
F	Zigadenus paniculatus	$_{a}$-	$_{b}$10	$_{a}$3	-	.02	.01
Total for Annual Forbs		0	0	23	0	0	0.94
Total for Perennial Forbs		515	620	422	10.79	22.98	6.84
Total for Forbs		515	620	445	10.79	22.98	7.78

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

BROWSE TRENDS --
Management unit 14 , Study no: 12

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Amelanchier utahensis	24	17	17	.72	1.07	.43
B	Artemisia tridentata vaseyana	65	67	69	10.02	12.66	9.03
B	Cercocarpus montanus	27	25	32	2.77	2.91	2.75
B	Chrysothamnus depressus	51	38	57	1.68	2.32	3.73
B	Gutierrezia sarothrae	5	2	5	.01	.03	.18
B	Juniperus osteosperma	0	1	0	-	-	-
B	Opuntia spp.	0	0	4	-	-	.03
B	Peraphyllum ramosissimum	30	24	27	3.87	3.62	3.76
B	Pinus edulis	0	3	5	.42	.69	.81
B	Quercus gambelii	0	24	23	4.10	7.50	4.75
B	Symphoricarpos oreophilus	77	71	69	5.64	9.85	7.94
Total for Browse		279	272	308	29.27	40.67	33.43

CANOPY COVER, LINE INTERCEPT --
Management unit 14 , Study no: 12

Species	Percent Cover	
	'99	'04
Amelanchier utahensis	-	1.31
Artemisia tridentata vaseyana	-	12.60
Cercocarpus montanus	-	1.89
Chrysothamnus depressus	-	3.70
Gutierrezia sarothrae	-	.20
Peraphyllum ramosissimum	-	4.16
Pinus edulis	2.40	3.63
Quercus gambelii	-	3.08
Symphoricarpos oreophilus	-	12.16

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 14 , Study no: 12

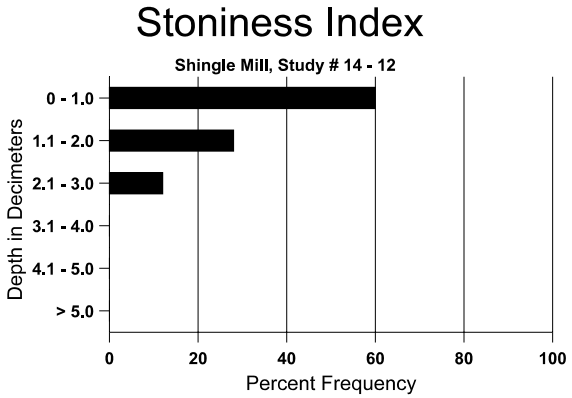
Species	Average leader growth (in)
	'04
Amelanchier utahensis	2.6
Artemisia tridentata vaseyana	1.5
Cercocarpus montanus	2.6
Peraphyllum ramosissimum	2.3

BASIC COVER --
Management unit 14 , Study no: 12

Cover Type	Average Cover %		
	'94	'99	'04
Vegetation	47.95	66.71	49.92
Rock	17.14	17.51	18.15
Pavement	2.46	5.48	6.04
Litter	25.22	40.04	30.17
Cryptogams	.28	.95	.11
Bare Ground	17.34	22.88	13.73

SOIL ANALYSIS DATA --
Management unit 14, Study no: 12, Study Name: Shingle Mill

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
18.7	63.7 (14.2)	7.3	26.9	20.6	52.6	3.4	5.6	86.4	0.4



PELLET GROUP DATA --
Management unit 14 , Study no: 12

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	-	4	11
Elk	5	-	10
Deer	17	27	21
Cattle	-	-	1

Days use per acre (ha)	
'99	'04
-	-
7 (17)	19 (46)
40 (99)	54 (134)
9 (22)	1 (2)

BROWSE CHARACTERISTICS --
Management unit 14 , Study no: 12

		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)
Amelanchier utahensis												
94	**860**	-	240	520	100	40	2	5	12	-	0	12/15
99	**840**	40	380	420	40	40	17	17	5	5	12	17/20
04	**400**	-	60	320	20	-	10	70	5	5	5	15/21
Artemisia nova												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	15/35
Artemisia tridentata vaseyana												
94	**2420**	740	120	1720	580	180	2	2	24	5	7	18/27
99	**2920**	20	380	2180	360	380	15	0	12	2	2	18/31
04	**2500**	4260	60	1540	900	300	44	9	36	20	20	16/28
Cercocarpus montanus												
94	**1020**	40	120	840	60	-	41	16	6	-	0	20/22
99	**860**	-	200	560	100	40	16	53	12	9	9	27/33
04	**940**	-	200	640	100	-	6	91	11	9	9	20/25
Chrysothamnus depressus												
94	**3600**	20	-	3600	-	-	0	0	-	-	0	5/9
99	**3360**	-	-	3360	-	-	1	0	-	-	0	4/8
04	**6000**	-	60	5940	-	-	24	4	-	-	0	6/10
Gutierrezia sarothrae												
94	**120**	-	-	120	-	-	0	0	-	-	0	8/8
99	**80**	-	-	80	-	-	0	0	-	-	0	6/6
04	**180**	-	-	180	-	-	0	0	-	-	0	7/11
Juniperus osteosperma												
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**20**	-	-	-	20	-	0	0	100	100	100	-/-
04	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Opuntia spp.												
94	**0**	20	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**100**	-	60	40	-	-	0	0	-	-	0	2/3

		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)
Peraphyllum ramosissimum												
94	**1520**	-	120	1320	80	20	36	3	5	1	3	18/27
99	**900**	-	60	820	20	20	42	20	2	-	0	18/25
04	**1060**	-	20	680	360	-	8	43	34	13	13	22/31
Pinus edulis												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**60**	-	60	-	-	-	0	0	-	-	33	-/-
04	**100**	20	100	-	-	-	0	0	-	-	0	-/-
Quercus gambelii												
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**3520**	-	1040	2400	80	360	24	10	2	2	2	25/21
04	**2440**	-	480	1600	360	500	43	7	15	7	7	19/15
Symphoricarpos oreophilus												
94	**6820**	100	900	5880	40	-	1	0	1	-	0	13/21
99	**5780**	80	340	5380	60	20	3	.34	1	.34	.34	14/23
04	**6500**	-	500	5900	100	40	11	12	2	.30	.30	12/20