

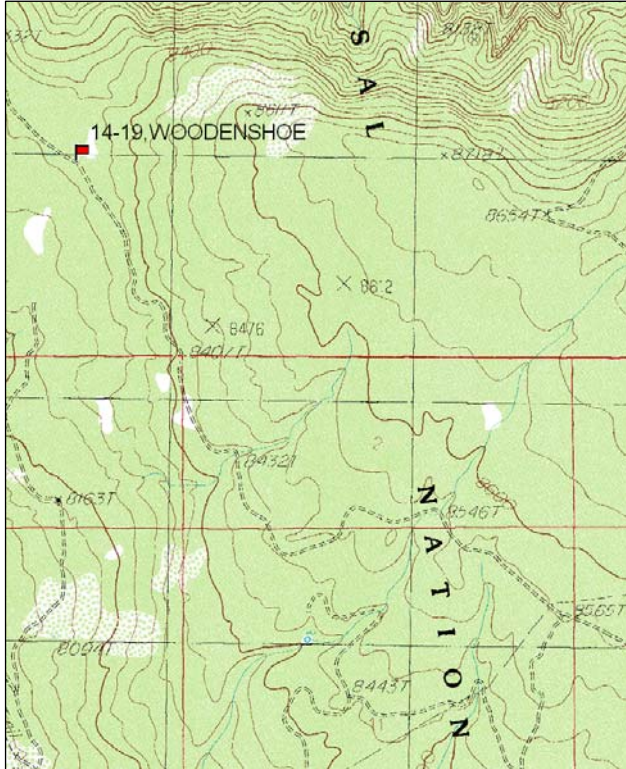
WOODENSHOE - TREND STUDY NO. 14-19-09

Vegetation Type: Logged Ponderosa Pine
Range Type: Crucial Deer Summer, Crucial Elk Summer
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,400 ft (2,560 m)
Aspect: Southwest
Slope: 2%
Transect bearing: 64 degrees magnetic.
Belt placement: line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft)

Directions:

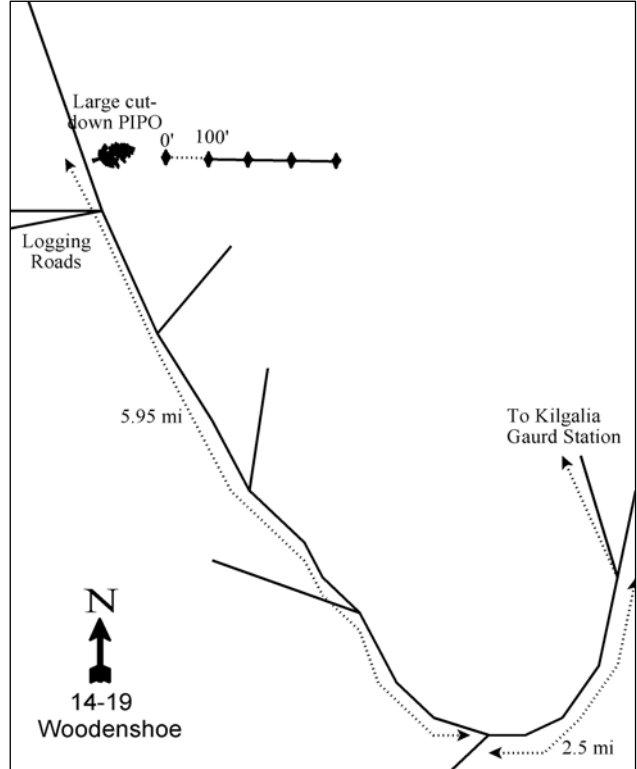
From the Kigalia Guard Station turnoff, go 2.5 miles southwest towards the Bears Ears. Turn right at the fork and proceed 2.05 miles to fork located just west of a cattleguard and opposite a corral. Turn right, and go north 1.05 mile to another fork (County Road #271a). Turn left toward Woodenshoe Point and go 1.35 miles to a fork. Stay left and continue 1.45 miles. At this point there are two overgrown, impassable logging roads taking off to the left. Go 0.05 miles (about 210 feet) past the logging roads to a moderately large, cut-down ponderosa on the right and a small clump of tall oak on the left. The transect starting point is about 10 feet east of the pine. The baseline is marked by the 1981 line-intercept red and green steel fence posts 16 inches tall. The 0-foot stake has browse tag #482 attached.

Map Name: Woodenshoe Butte



Township: 35S, Range: 18E, Section: 34

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 595546 E 4172181 N

WOODENSHOE - TREND STUDY NO. 14-19

Site Information

Site Description: The study is located on summer range on a plateau on the southwest portion of Elk Ridge. The plateau drains west into the steep slickrock of Woodenshoe Canyon and is managed by the Forest Service as part of the Twin Springs allotment. The area was burned in the summer of 2003 as part of the Woodenshoe wildfire caused by a campfire that burned 2,710 acres. Prior to burning the vegetation was dense and dominated mainly by ponderosa pine (*Pinus ponderosa*), Gambel oak (*Quercus gambelii*), snowberry (*Symphoricarpos oreophilus*), mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), and various perennial grasses. The area appears to be drier than the other summer range studies, which explains the lack of aspen (*Populus tremuloides*). The study baseline samples some open meadow areas along with the ponderosa pine forest. There has been selective removal of ponderosa pines, but no large scale logging has taken place on the site. The numerous roads traversing the plateau facilitate logging, grazing management, and easy access to mining claims. There has been geophysical exploration, heavy uranium drilling, and oil-gas leasing in the general area. Pellet group data has indicated light use on the site by deer and elk with more moderate use by cattle since 1999 (Table - Pellet Group Data).

Browse: The fire burned mostly as an understory fire, although a few ponderosa pines did completely burn. Ponderosa pine is the dominant tree species. Many trees are large (75-100 ft.) and they visually dominate the area. The overhead canopy cover was reduced in 2004, after the fire, but increased to pre-fire levels in 2009 (Table - Canopy Cover). Gambel oak and mountain big sagebrush cover and density decreased in 2004, after the fire, but also returned to pre-fire levels in 2009 (Table - Browse Trends, Table Browse Characteristics). Other palatable shrubs that are less common include chokecherry (*Prunus virginiana*) and bitterbrush (*Purshia tridentata*).

Herbaceous Understory: Grasses are diverse and fairly abundant on the site. The small openings in the overstory support a good, dry meadow-like stand of grasses. Common species are mutton bluegrass (*Poa fendleriana*), Kentucky bluegrass (*P. pratensis*), bottlebrush squirreltail (*Sitanion hystrix*), Letterman needlegrass (*Stipa lettermani*), and sedge (*Carex* sp.). Kentucky bluegrass was more common in the openings and has become the dominant grass species in cover on the site. Forbs are also very diverse and have increased substantially since the fire. Some of the more common species include trailing fleabane (*Erigeron flagellaris*), western yarrow (*Achillea millefolium*), and silky lupine (*Lupinus sericeus*). Nested frequency of grasses and forbs was lower in 2004, probably due to the fire, but increased to greater than pre-fire values in 2009 (Table - Herbaceous Trends).

Soil: The soil is a loam with a slightly acid pH and moderately deep effective rooting depth (Table - Soil Analysis Data). Parent material of the soil is granite, with bedrock near the surface in some places. The average bare ground cover increased in 2004, after the fire, but has been low in all sample years due to a high amount of vegetation and litter cover (Table - Basic Cover). The soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1986 to 1992 - stable (0):** Differences in density may be related to the larger sample area used in 1992; therefore trend was determined using other parameters. Decadence decreased in mountain big sagebrush from 63% to 30% and poor vigor of snowberry decreased from 29% to 3%.
- **1992 to 1999 - stable (0):** Density of mountain big sagebrush decreased slightly, but decadence decreased from 30% to 8% as well. Cover remained similar for the preferred browse species sampled.
- **1999 to 2004 - down (-2):** The fire decreased the cover and density of most of the browse species on the site.

- **2004 to 2009 - up (+2):** Most browse species increased in cover and density to pre-fire levels. Chokecherry density and cover increased substantially. There was increased recruitment of young mountain big sagebrush plants.

Grass:

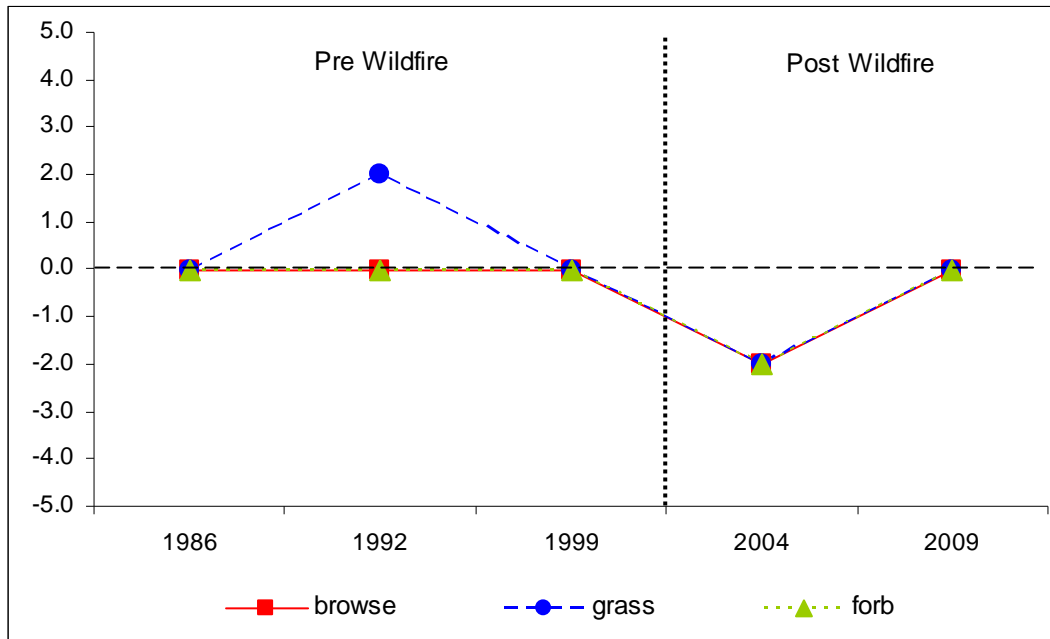
- **1986 to 1992 - up (+2):** There was a two-fold increase in the sum of nested frequency of perennial grasses with a significant increase in the nested frequency of slender wheatgrass (*Agropyron trachycaulum*), Kentucky bluegrass, subalpine needlegrass (*Stipa columbiana*), and Letterman needlegrass.
- **1992 to 1999 - down (-2):** There was a 35% decrease in the sum of nested frequency of perennial grasses and cover decreased from 15% to 10%. There was a significant decrease in the nested frequency of mutton bluegrass and Letterman needlegrass. There was a significant increase in the nested frequency of Kentucky bluegrass.
- **1999 to 2004 - down (-2):** After the fire in 2003 the sum of nested frequency of perennial grasses decreased 34% and cover decreased to 6%. There was a significant decrease in nested frequency of Kentucky bluegrass and slender wheatgrass, and a significant increase in nested frequency of Letterman needlegrass.
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial grasses increased 63% and cover increased to 12%. There was a significant increase in the nested frequency of mutton bluegrass and slender wheatgrass.

Forb:

- **1986 to 1992 - stable (0):** There was little change in the sum of nested frequency of perennial forbs.
- **1992 to 1999 - stable (0):** The sum of nested frequency and cover of perennial forbs changed little.
- **1999 to 2004 - down (-2):** After the fire in 2003, the sum of nested frequency of perennial forbs decreased by 31%, and the cover and sum of nested frequency of annual forbs increased substantially. Several palatable species including thistleleaf peavine (*Lathyrus lanszwertii*) and trailing fleabane decreased significantly in nested frequency.
- **2004 to 2009 - up (+2):** The sum of nested frequency of perennial forbs increased to higher than pre-fire levels and cover increased from 7% to 16%. Annual forbs sum of nested frequency and cover decreased substantially as well.

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 14 Study no: 19



HERBACEOUS TRENDS--
Management unit 14, Study no: 19

Type	Species	Nested Frequency					Average Cover %			
		'86	'92	'99	'04	'09	'92	'99	'04	'09
G	Agropyron trachycaulum	a-	b29	b43	a-	b32	.41	.55	-	.51
G	Bouteloua gracilis	-	7	-	-	-	.06	-	-	-
G	Bromus anomalus	5	12	16	11	6	.29	.13	.34	.09
G	Bromus tectorum (a)	-	-	-	-	11	-	-	-	.33
G	Carex sp.	44	32	23	38	38	2.24	.93	2.08	2.09
G	Koeleria cristata	-	2	-	-	-	.03	-	-	-
G	Muhlenbergia montana	-	8	7	6	8	.45	.06	.03	.76
G	Poa fendleriana	bc54	c99	ab36	a7	b41	1.75	.70	.05	1.13
G	Poa pratensis	a-	b82	c126	b58	bc101	3.87	7.08	1.25	4.93
G	Sitanion hystrix	bc63	c92	a10	ab30	ab42	3.43	.18	1.17	.83
G	Stipa columbiana	a-	b22	ab9	ab6	b15	.73	.12	.10	.38
G	Stipa comata	b30	ab12	a8	a1	a1	.39	.07	.03	.03
G	Stipa lettermani	a-	c40	b8	c33	bc26	1.21	.27	1.03	1.18
Total for Annual Grasses		0	0	0	0	11	0	0	0	0.33
Total for Perennial Grasses		196	437	286	190	310	14.90	10.13	6.11	11.96
Total for Grasses		196	437	286	190	321	14.90	10.13	6.11	12.30
F	Achillea millefolium	26	32	40	23	36	.89	1.39	.81	1.89
F	Agoseris glauca	a-	a-	b6	b11	b17	-	.02	.08	.13
F	Androsace septentrionalis (a)	-	-	-	-	2	-	-	-	.00
F	Arabis sp.	-	-	-	-	3	-	-	-	.00

Type	Species	Nested Frequency					Average Cover %			
		'86	'92	'99	'04	'09	'92	'99	'04	'09
F	<i>Arenaria congesta</i>	a1	a3	a6	a3	b36	.03	.12	.15	.63
F	<i>Artemisia ludoviciana</i>	8	-	-	-	-	-	-	-	-
F	<i>Aster chilensis</i>	a-	ab5	b14	ab3	b14	.06	.06	.03	.37
F	<i>Astragalus</i> sp.	-	-	-	4	1	-	-	.03	.00
F	<i>Calochortus nuttallii</i>	-	-	3	-	4	-	.00	-	.15
F	<i>Castilleja linariaefolia</i>	b25	a2	a-	a-	a-	.00	-	-	-
F	<i>Chenopodium album</i> (a)	-	-	-	-	5	-	-	-	.01
F	<i>Chenopodium</i> sp. (a)	-	5	-	2	-	.01	-	.00	-
F	<i>Collinsia parviflora</i> (a)	-	-	a3	b130	a15	-	.01	2.06	.05
F	<i>Collomia linearis</i> (a)	-	-	a-	a2	b13	-	-	.01	.37
F	<i>Comandra pallida</i>	2	-	1	-	-	-	.00	-	-
F	<i>Crepis acuminata</i>	-	-	-	4	8	-	-	.03	.04
F	<i>Delphinium nuttallianum</i>	-	-	-	3	1	-	-	.00	.00
F	<i>Epilobium brachycarpum</i> (a)	-	8	-	-	-	.04	-	-	-
F	<i>Erigeron divergens</i>	a10	b23	a1	a-	a-	.30	.00	-	-
F	<i>Erigeron eatonii</i>	a-	a3	a-	a3	b44	.03	-	.03	1.19
F	<i>Erigeron flagellaris</i>	ab57	b92	b94	a52	c137	2.71	2.15	1.78	6.63
F	<i>Eriogonum racemosum</i>	21	5	14	6	12	.05	.08	.07	.08
F	<i>Gayophytum ramosissimum</i> (a)	-	-	-	12	8	-	-	.45	.01
F	<i>Heterotheca villosa</i>	-	3	-	-	-	.63	-	-	-
F	<i>Ipomopsis aggregata</i>	-	4	4	3	4	.03	.04	.00	.03
F	<i>Lappula occidentalis</i> (a)	-	-	-	2	5	-	-	.03	.01
F	<i>Lathyrus lanszwertii</i>	b77	b49	b58	a18	a18	.93	1.61	.38	.41
F	<i>Lupinus sericeus</i>	ab28	a13	ab31	a17	b45	.14	.91	2.14	3.05
F	<i>Lychnis drummondii</i>	-	-	-	-	-	-	-	.00	-
F	<i>Microsteris gracilis</i> (a)	-	a3	b35	b30	b28	.00	.18	.36	.13
F	<i>Navaretia breweri</i> (a)	-	-	a-	b14	b13	-	-	.09	.03
F	<i>Oenothera</i> sp.	-	2	-	-	-	.03	-	-	-
F	<i>Penstemon strictus</i>	b35	a16	a5	a6	a9	.10	.07	.07	.13
F	<i>Phacelia</i> sp.	-	4	-	-	-	.01	.03	-	-
F	<i>Phlox longifolia</i>	b41	b60	b46	b61	a8	.43	.11	1.00	.05
F	<i>Polygonum douglasii</i> (a)	-	c74	ab18	b37	a11	.42	.04	.33	.02
F	<i>Senecio canus</i>	b28	a4	a7	a9	a3	.01	.01	.09	.16
F	<i>Senecio multilobatus</i>	-	-	2	3	1	.00	.00	.00	.00
F	<i>Stellaria jamesiana</i>	-	1	4	1	4	.03	.03	.03	.03
F	<i>Taraxacum officinale</i>	a-	b26	bc27	a-	c46	.49	.29	-	.93
F	<i>Tragopogon dubius</i>	-	8	3	4	13	.20	.03	.03	.08
F	<i>Trifolium</i> sp.	-	-	-	-	6	-	-	-	.09
F	Unknown forb-annual (a)	-	8	-	-	-	.07	-	-	-
F	Unknown forb-perennial	2	12	-	-	-	.02	-	-	-
Total for Annual Forbs		0	98	56	229	100	0.55	0.23	3.36	0.64
Total for Perennial Forbs		361	367	366	234	470	7.18	7.00	6.79	16.15
Total for Forbs		361	465	422	463	570	7.73	7.24	10.15	16.80

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

BROWSE TRENDS--

Management unit 14, Study no: 19

Type	Species	Strip Frequency				Average Cover %			
		'92	'99	'04	'09	'92	'99	'04	'09
B	Artemisia tridentata vaseyana	44	41	11	22	3.44	2.59	.71	2.83
B	Chrysothamnus depressus	1	1	0	0	.00	.00	-	-
B	Mahonia repens	30	29	27	30	.71	1.04	1.23	1.35
B	Pinus ponderosa	8	8	7	8	19.45	1.32	1.48	.31
B	Prunus virginiana	1	0	1	6	.00	-	.00	1.12
B	Purshia tridentata	8	9	2	2	.97	.21	.06	.18
B	Quercus gambelii	36	37	26	30	5.79	6.10	1.96	6.50
B	Rosa woodsii	2	1	0	0	.00	.00	-	-
B	Symphoricarpos oreophilus	58	53	38	41	12.09	11.84	4.14	6.91
Total for Browse		188	179	112	139	42.47	23.13	9.60	19.22

CANOPY COVER, LINE INTERCEPT--

Management unit 14, Study no: 19

Species	Percent Cover		
	'99	'04	'09
Artemisia tridentata vaseyana	-	1.48	2.18
Mahonia repens	-	.60	.93
Pinus ponderosa	21.39	5.84	21.79
Purshia tridentata	-	.06	.13
Quercus gambelii	3.00	1.04	9.05
Symphoricarpos oreophilus	-	5.46	10.76

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 14, Study no: 19

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata vaseyana	2.7	2.0
Purshia tridentata	3.3	2.0

POINT-QUARTER TREE DATA--

Management unit 14, Study no: 19

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Pinus ponderosa	52	-	33	12.8	-	12.4
Quercus gambelii	100	-	72	2.7	-	1.9

BASIC COVER--

Management unit 14, Study no: 19

Cover Type	Average Cover %				
	'86	'92	'99	'04	'09
Vegetation	8.75	54.92	40.18	27.22	44.67
Rock	3.50	2.12	1.31	2.61	2.68
Pavement	0	0	.16	.18	.31
Litter	79.25	61.79	62.31	54.27	54.84
Cryptogams	0	.92	.07	1.48	.38
Bare Ground	8.50	14.34	11.56	23.31	13.93

SOIL ANALYSIS DATA --

Management unit 14, Study no: 19, Study Name: Woodenshoe

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
18.9	6.5	48.4	31.1	20.6	3.8	7.6	204.8	0.4

PELLET GROUP DATA--

Management unit 14, Study no: 19

Type	Quadrat Frequency				Days use per acre (ha)		
	'92	'99	'04	'09	'99	'04	'09
Rabbit	11	3	2	4	-	-	-
Grouse	4	-	-	-	-	-	-
Elk	4	1	-	2	3 (7)	7 (17)	1 (3)
Deer	11	8	4	3	7 (17)	13 (31)	5 (12)
Cattle	4	8	3	15	26 (65)	26 (65)	22 (54)

BROWSE CHARACTERISTICS--

Management unit 14, Study no: 19

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Artemisia tridentata vaseyana									
86	1998	3	33	63	266	33	7	20	26/18
92	1660	39	31	30	460	17	2	7	-/-
99	1500	31	61	8	80	15	3	1	25/35
04	800	65	33	3	60	60	0	3	16/23
09	1280	28	72	0	400	0	0	0	16/21
Ceanothus fendleri									
86	132	50	50	-	-	0	0	0	7/20
92	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	-/-

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
Chrysothamnus depressus										
86	0	0	0	-	-	0	0	0	-/-	
92	20	0	100	-	-	0	0	0	-/-	
99	20	0	100	-	-	0	100	0	-/-	
04	0	0	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	9/14	
Mahonia repens										
86	4599	3	97	-	266	0	0	0	6/6	
92	4600	56	44	-	120	2	0	0	-/-	
99	3640	31	69	-	80	0	0	0	4/8	
04	3660	19	81	-	-	.54	0	0	4/6	
09	6680	56	44	-	120	0	0	0	4/6	
Pinus edulis										
86	0	0	0	-	-	0	0	0	-/-	
92	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	20	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	-/-	
Pinus ponderosa										
86	133	100	0	0	-	0	0	0	-/-	
92	180	22	78	0	60	0	0	0	-/-	
99	160	13	88	0	-	0	0	0	-/-	
04	160	0	75	25	-	0	0	13	-/-	
09	160	0	88	13	40	0	0	0	-/-	
Populus tremuloides										
86	0	0	0	-	-	0	0	0	-/-	
92	0	0	0	-	20	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	-/-	
Prunus virginiana										
86	199	100	0	-	-	0	0	0	-/-	
92	40	0	100	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	40	50	50	-	-	0	0	0	25/13	
09	300	67	33	-	-	0	0	0	19/10	
Purshia tridentata										
86	66	0	100	0	-	100	0	0	19/13	
92	200	60	30	10	-	50	30	0	-/-	
99	200	10	70	20	-	70	20	10	11/23	
04	40	50	50	0	-	0	50	0	6/13	
09	40	50	50	0	-	50	50	0	7/19	

		Age class distribution					Utilization		
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)
Quercus gambelii									
86	2665	75	25	0	2733	3	0	0	77/44
92	4000	77	21	3	9420	22	.50	.50	-/-
99	3580	73	25	2	1220	.55	0	1	49/44
04	2300	87	13	0	20	2	0	0	20/14
09	3120	29	71	0	2920	0	0	0	26/35
Rosa woodsii									
86	532	63	37	-	-	0	0	13	24/17
92	80	100	0	-	-	0	0	0	-/-
99	40	0	100	-	-	0	0	0	11/15
04	0	0	0	-	-	0	0	0	13/7
09	0	0	0	-	20	0	0	0	10/9
Symphoricarpos oreophilus									
86	15065	40	60	0	2399	4	0	29	26/16
92	4320	31	66	2	460	13	2	3	-/-
99	3280	36	64	0	240	0	0	0	31/50
04	2400	35	65	0	-	3	7	0	16/30
09	3160	23	77	0	180	0	16	0	17/26