

Trend Study 17-34-07

Study site name: Maple Mountain Face.

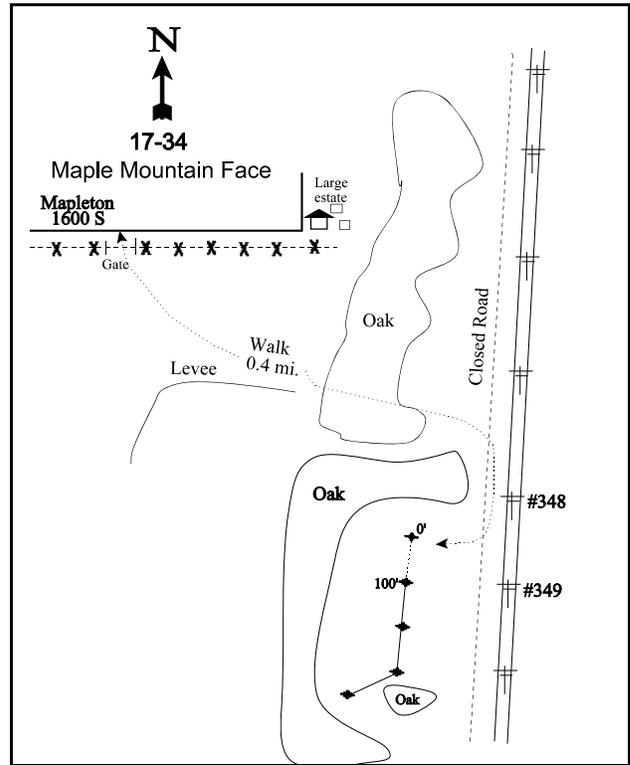
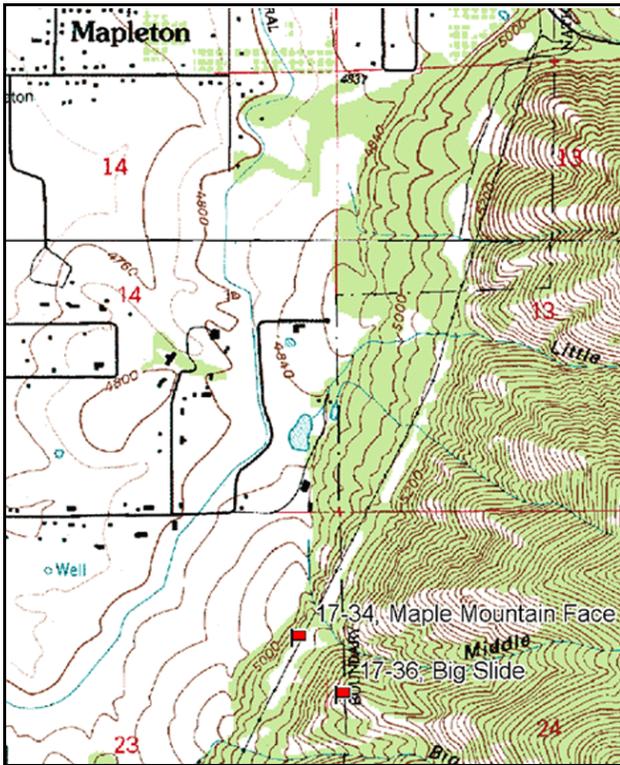
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 192 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (87ft).

LOCATION DESCRIPTION

Drive up 1600 South in Mapleton to the end of road. Park and hike east for 0.4 miles to the old road that runs parallel to power lines. A small sagebrush clearing west of the road is where the site is located. The 0-foot baseline stake is in the north end of the clearing, 33 paces from power pole #349 at an azimuth of 342 degrees magnetic. The 0-foot stake has browse tag #442 attached. The study stakes are 12-18" tall green fenceposts.



Map Name: Spanish Fork Peak

Diagrammatic Sketch

Township 8S, Range 3E, Section 23

GPS: NAD 83, UTM 12T 452132 E 4440284 N

## DISCUSSION

### Maple Mountain Face - Trend Study No. 17-34

#### Study Information

This study samples a sagebrush-grass range community. It is one of the few remaining severe winter ranges of its kind that is located on the upper lake terrace southeast of Mapleton [elevation: 5,100 feet (1,555 m), slope: 2%, aspect: northwest]. The nearest source of perennial water is a canal located 0.4 miles (0.6 km) to the west. A fire burned through the study prior to the 1997 sampling. In addition to being used by deer and elk in the winter, the study has been occasionally grazed in the spring by cattle. An old road to the north of the trail was being used as an ATV and horse trail in 2007. From the pellet group transect, there were 4 deer days use/acre (10 ddu/ha) in 2002 and 41 deer days use/acre (101 ddu/ha) in 2007. Elk use was estimated at 2 days use/acre (5 edu/ha) in 2002, which increased to 28 days use/acre (69 edu/ha) in 2007. Cattle use was estimated at 19 days use/acre (47 cdu/ha) in 2002 and 1 day use/acre (2 cdu/ha) in 2007. There were an estimated 10 horse days use/acre (24 hdu/ha) in 2007. There was also a housing development being constructed 0.5 miles (0.8 km) to the west in 2007.

#### Soil

This study is located within the Cleverly soil series, which consists of deep, well-drained soils that formed in alluvium. The soils are classified as coarse-loamy, mixed, superactive, mesic Typic Haploxerolls (USDA-NRCS 2007). Specifically at the study, the soil has a loam texture and a slightly acidic soil reaction (pH of 6.3). The parent material appears to be limestone. Rock, pavement, and bare ground cover are low, and collectively have averaged 9% of the relative ground cover since 1997. Vegetation cover is relatively high and has comprised an average 67% of the relative ground cover since 1997. The erosion condition was classified as stable in 2002 and 2007.

#### Browse

The preferred browse species that are present include mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) and antelope bitterbrush (*Purshia tridentata*). Sagebrush canopy cover was 9% in 2007. The estimated sagebrush decreased from 500 plants/acre (1,238 plants/ha) in 1983 to 432 plants/acre (1,069 plants/ha) in 1989. As a result of the pre-1997 wildfire, the density decreased further to 220 plants/acre (545 plants/ha) in 1997. Since then, the density increased to 580 plants/acre (1,435 plants/ha) by 2007. Seedlings were present at moderate densities in 1997 and 2002, and a high density in 2007. The age distribution of the sagebrush population has widely fluctuated in each sample year. Young plants were only sampled in 1997 and 2007, and accounted for 100% and 24% of the population, respectively. Decadent plants accounted for 40% of the population in 1983 and increased to 85% in 1989, but decadence was low in subsequent sample years. Dead plants were only sampled in 1997, and those were plants that had died in the pre-1997 wildfire. There have been no plants with poor vigor, except in 1989 when 15% of the plants were chlorotic. The average annual leader growth was 4.0 inches (10.2 cm) in 2002 and 1.9 inches (4.9 cm) in 2007. Browse use has ranged from light to light-moderate.

Antelope bitterbrush canopy cover was 4% in 2007. Bitterbrush was not sampled prior to the 1997 wildfire. However, it is probable that bitterbrush was present but was not sampled until the baseline was extended in 1997, which increased the sample area. The presence of dead plants in the 1997 reading support this hypothesis. Since 1997, the density has been fairly stable at approximately 130 plants/acre (322 plants/ha). Young plants were only sampled in 1997 and comprised 83% of the population. There have been few or no decadent plants in any of the sample years, and no bitterbrush have exhibited poor vigor. The average annual leader growth was 4.0 inches (10.2 cm) in 2002 and 1.9 inches (4.9 cm) in 2007. Browse use on bitterbrush has been light-moderate to moderate-heavy.

Gambel oak (*Quercus gambelii*) clones surround the study site, but they do not exhibit signs of any hedging. Skunkbush sumac (*Rhus trilobata*) is present at low densities, and the few plants have exhibited moderate and heavy use. There was also some curl-leaf mountain mahogany (*Cercocarpus ledifolius*) planted after the burn but it has not been sampled in the density strips.

#### Herbaceous Understory

The herbaceous understory is dominated by perennial grasses and forbs. The grass component is abundant and has included between one and 10 perennial species. Cover for perennial species was 46% in 1997, 60% in 2002, and 49% in 2007. The dominant perennial grass species is bulbous bluegrass (*Poa bulbosa*). It has comprised an average 92% of the grass cover and 48% of the total ground cover since 1997. Bulbous bluegrass has a phenology similar to that of annual grasses (Stewart and Hull 1949), and may be limiting the establishment of other species. Non-dominant, but still common, perennial grasses include orchardgrass (*Dactylis glomerata*), and Sandberg bluegrass (*Poa secunda*). Annual grasses were reported to be very abundant before the wildfire. Since 1997, cheatgrass (*Bromus tectorum*), Japanese brome (*Bromus japonicus*), and rattlesnake brome (*Bromus brizaeformis*) have been sampled. Annual grass cover has averaged less than 1% since 1997.

The forb component is also abundant and diverse, but has declined. Since 1997, the perennial forb cover has steadily decreased from 39% to 18%. Much of the decrease in forb cover is attributed to decreasing arrowleaf balsamroot (*Balsamorhiza sagittata*) cover, which was the dominant forb through 2002. The other dominant perennial species are spreading fleabane (*Erigeron divergens*) and curlycup gumweed (*Grindelia squarrosa*). Annual forb cover has averaged less than 1% since 1997. Field bindweed (*Convolvulus arvensis*), a noxious weed, was first sampled in 1989, but frequency and cover have remained low.

#### 1989 TREND ASSESSMENT

The browse trend is down. The density of sagebrush decreased 14%. No seedling or young plants were sampled, and decadence increased from 40% to 85% of the population. Plants exhibiting poor vigor increased from 0% to 15% of the population. Additionally, the average height and crown measurements decreased 10 inches (25 cm) and 16 inches (41 cm), respectively. The grass trend is down. Bulbous bluegrass nested frequency significantly increased, and all other perennial species that had been sampled in 1983, were not sampled in 1989. The forb trend is slightly down. The sum of nested frequency of perennial forbs decreased 12%, and field bindweed was sampled for the first time. Grasshopper use on forbs was abundant, and arrowleaf balsamroot had been grazed by deer.

browse - down (-2)

grass - down (-2)

forb - slightly down (-1)

#### 1997 TREND ASSESSMENT

The browse trend is stable. Although the 1996 wildfire consumed the browse component, browse diversity increased as a result of the post-fire reseeding. The density of sagebrush decreased 49%, but the new population was comprised of young, vigorous plants. In addition to the young plants, there were 200 seedlings/acre (495 seedlings/ha). The average height and crown measurements of the new population were approximately equal to those of the population that was consumed in the fire. Browse use on sagebrush was exclusively light. The additional browse species that were sampled included bitterbrush, Gambel oak, and skunkbush sumac (*Rhus trilobata*). Browse use was moderate on bitterbrush, and light on the other two species. The grass trend is up. The number of perennial grass species that were sampled increased from one to four, but the cover of seeded grasses was less than 1%. There was a significant increase in the nested frequency of Sandberg bluegrass. The forb trend is up. The sum of nested frequency of perennial forbs increased more than four-fold, and the number of perennial species increased from five to 17. There were significant increases in the nested frequencies of arrowleaf balsamroot and spreading fleabane. Alfalfa (*Medicago sativa*) and small burnet (*Sanguisorba minor*) established well. The Desirable Components Index (DCI) score was very poor due to the low preferred browse cover, low perennial grass cover (excluding

bulbous bluegrass), and the presence of a noxious weed.

winter range condition (DCI) - very poor (18) Mid-level potential scale  
browse - stable (0)                      grass - up (+2)                      forb - up (+2)

#### 2002 TREND ASSESSMENT

The browse trend is slightly up. Although the density of sagebrush increased two-fold, the estimated density remained relatively low. The age class distribution shifted from young to mature plants. Decadence and poor vigor remained stable at 0%. Browse use on sagebrush remained light. The density of bitterbrush increased 17%. Like sagebrush, the bitterbrush population shifted from young to mature plants, and decadence and poor vigor remained stable at 0%. Browse use on bitterbrush shifted from moderate to moderate-heavy. The grass trend is slightly down. Although the number of perennial species increased from four to nine, the sum of nested frequency of perennial grasses decreased 19% (excluding bulbous bluegrass). There were significant decreases in the nested frequencies of orchard grass and Sandberg bluegrass. The forb trend is down. Excluding field bindweed, the sum of nested frequency of perennial forbs decreased 53%, including significant decreases of four species. There was heavy animal use on alfalfa and yellow salsify (*Tragopogon dubius*). The DCI score remained very poor.

winter range condition (DCI) - very poor (17) Mid-level potential scale  
browse - slightly up (+1)                      grass - slightly down (-1)                      forb - down (-2)

#### 2007 TREND ASSESSMENT

The browse trend is up. The density of sagebrush increased 32%. There was a large increase in reproduction; the density of seedlings increased from 20 seedlings/acre (50 seedlings/ha) to 1,600 seedlings/acre (3,960 seedlings/ha). There were also 140 young plants/acre (345 plants/ha), and young plants comprised 24% of the population. Decadence increased to 3%, but there were no plants with poor vigor. The average height and crown measurements increased 10 inches (25 cm) and 25 inches (64 cm), respectively. Browse use on sagebrush remained light. The density of bitterbrush remained stable. Decadence increased to 14% of the population. Although no plants were classified as having poor vigor, it was noted that the plants were producing fewer and smaller leaves than normal. The average height and crown measurements increased 20 inches (51 cm) and 32 inches (81 cm), respectively. Browse use on bitterbrush shifted from moderate-heavy to light-moderate. The grass trend is up. Excluding bulbous bluegrass, the sum of nested frequency of perennial grasses increased 30%. Sandberg bluegrass increased significantly in nested frequency, while bluebunch wheatgrass decreased significantly in nested frequency. Although there were significant increases in the nested frequencies of rattlesnake brome and Japanese brome, annual grasses comprised 1% of the total ground cover. The forb trend is up. Excluding field bindweed, the sum of nested frequency of perennial forbs increased 70%. There was a shift in dominance as arrowleaf balsamroot decreased n cover from 29% to 4%, and spreading fleabane and curlycup gumweed increased in cover. Yellow salsify had been heavily grazed, and grasshoppers had denuded the alfalfa plants. The DCI score increased to poor-fair due to the increase in preferred browse cover, which surpassed the 5% minimal cover threshold.

winter range condition (DCI) - poor-fair (49) Mid-level potential scale  
browse - up (+2)                      grass - up (+2)                      forb - up (+2)

HERBACEOUS TRENDS --  
Management unit 17 , Study no: 34

T y p e	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
G	Agropyron cristatum	-	-	-	a15	a10	-	.11	.63
G	Agropyron intermedium	-	-	a4	-	a8	.03	-	.76
G	Agropyron spicatum	-	-	-	b21	a1	-	.17	.03
G	Aristida purpurea	-	-	-	a-	b5	-	.00	.09
G	Bromus brizaeformis (a)	-	-	-	a3	b49	-	.00	.26
G	Bromus japonicus (a)	-	-	-	a12	b35	-	.05	.20
G	Bromus tectorum (a)	-	-	a83	a48	a60	.55	.15	.94
G	Dactylis glomerata	-	-	b66	a22	a21	.75	.64	1.00
G	Elymus glaucus	a2	-	-	a2	-	-	.03	-
G	Melica bulbosa	-	-	-	a17	a22	-	.11	.42
G	Poa bulbosa	a360	c395	bc372	bc387	b378	41.55	58.08	44.19
G	Poa pratensis	b61	-	-	a5	a1	-	.03	.03
G	Poa secunda	a24	-	b124	a62	b120	3.67	.78	1.52
G	Sporobolus cryptandrus	-	-	-	a13	a16	-	.21	.36
Total for Annual Grasses		0	0	83	63	144	0.55	0.21	1.40
Total for Perennial Grasses		447	395	566	544	582	46.02	60.18	49.07
Total for Grasses		447	395	649	607	726	46.56	60.39	50.47
F	Allium sp.	-	-	a1	-	a1	.00	-	.00
F	Astragalus sp.	-	-	b5	a-	-	.04	.00	-
F	Balsamorhiza sagittata	a103	a99	c248	b156	a82	34.34	28.52	4.27
F	Calochortus nuttallii	a5	-	a15	a2	a4	.03	.01	.01
F	Cirsium sp.	-	-	a3	a2	a1	.00	.00	.15
F	Convolvulus arvensis	-	a1	a3	a7	a3	.18	.09	.03
F	Collinsia parviflora (a)	-	-	3	-	-	.00	-	-
F	Cruciferae	-	-	3	-	-	.03	-	-
F	Epilobium brachycarpum (a)	-	-	a3	-	a3	.00	-	.00
F	Eriogonum brevicaulis	-	-	-	1	-	-	.00	-
F	Erodium cicutarium (a)	-	-	a3	a9	b46	.00	.02	1.16
F	Erigeron divergens	a7	a1	b59	-	c119	1.50	-	8.25
F	Galium aparine (a)	-	-	a3	a4	a1	.00	.01	.03
F	Grindelia squarrosa	-	-	-	-	96	-	-	3.28
F	Helianthus annuus (a)	-	a5	-	a7	-	-	.02	-
F	Lathyrus brachycalyx	ab4	ab6	b8	a1	ab4	.09	.01	.03
F	Lactuca serriola	-	b15	ab10	a-	-	.04	.00	-
F	Linum lewisii	-	-	8	-	-	.02	-	-

Type	Species	Nested Frequency					Average Cover %		
		'83	'89	'97	'02	'07	'97	'02	'07
F	<i>Medicago sativa</i>	-	-	<sub>a</sub> 28	<sub>a</sub> 29	<sub>a</sub> 34	.67	.64	1.36
F	<i>Phlox longifolia</i>	-	-	<sub>a</sub> 9	<sub>ab</sub> 13	<sub>b</sub> 23	.04	.05	.18
F	<i>Plantago patagonica</i> (a)	-	-	-	-	12	-	-	.02
F	<i>Polygonum douglasii</i> (a)	-	-	-	4	-	-	.01	-
F	<i>Sanguisorba minor</i>	-	-	<sub>b</sub> 98	<sub>a</sub> 21	<sub>a</sub> 26	2.21	.48	.49
F	<i>Sisymbrium altissimum</i> (a)	-	-	15	-	-	.10	-	-
F	<i>Sphaeralcea coccinea</i>	-	-	-	-	-	-	.00	-
F	<i>Taraxacum officinale</i>	-	-	3	-	-	.03	-	-
F	<i>Tragopogon dubius</i>	<sub>a</sub> 18	-	<sub>a</sub> 4	<sub>a</sub> 12	<sub>a</sub> 12	.06	.09	.11
F	Unknown forb-perennial	1	-	-	-	-	-	-	-
F	<i>Verbascum thapsus</i>	-	-	1	-	-	.15	-	-
F	<i>Zigadenus paniculatus</i>	-	-	-	-	1	-	-	.03
Total for Annual Forbs		0	5	27	24	62	0.12	0.07	1.22
Total for Perennial Forbs		138	122	506	244	406	39.47	29.92	18.23
Total for Forbs		138	127	533	268	468	39.60	29.99	19.46

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

#### BROWSE TRENDS --

Management unit 17 , Study no: 34

Type	Species	Strip Frequency			Average Cover %		
		'97	'02	'07	'97	'02	'07
B	<i>Artemisia tridentata vaseyana</i>	6	15	23	.18	1.69	5.39
B	<i>Gutierrezia sarothrae</i>	0	0	2	-	-	.00
B	<i>Purshia tridentata</i>	6	7	7	.00	.93	1.07
B	<i>Quercus gambelii</i>	2	1	2	1.48	1.48	.91
B	<i>Rhus trilobata</i>	2	2	1	.06	.15	.00
Total for Browse		16	25	35	1.73	4.26	7.38

#### CANOPY COVER, LINE INTERCEPT --

Management unit 17 , Study no: 34

Species	Percent Cover	
	'02	'07
<i>Artemisia tridentata vaseyana</i>	-	8.96
<i>Purshia tridentata</i>	-	3.63
<i>Quercus gambelii</i>	.10	1.79

KEY BROWSE ANNUAL LEADER GROWTH --  
 Management unit 17 , Study no: 34

Species	Average leader growth (in)	
	'02	'07
Artemisia tridentata vaseyana	4.0	1.9
Purshia tridentata	4.0	1.9

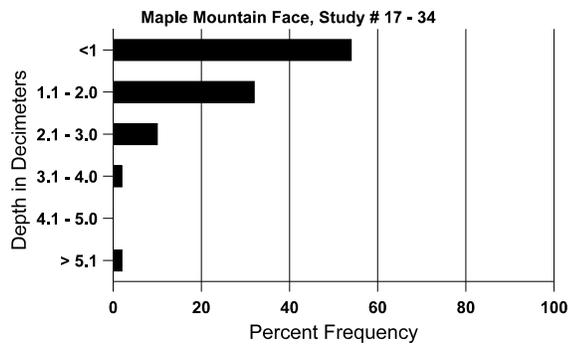
BASIC COVER --  
 Management unit 17 , Study no: 34

Cover Type	Average Cover %				
	'83	'89	'97	'02	'07
Vegetation	4.00	50.75	68.12	80.30	74.11
Rock	.75	.75	1.31	.59	.46
Pavement	3.00	6.75	6.49	2.96	1.87
Litter	91.00	28.75	18.82	24.19	29.54
Cryptogams	0	0	3.25	1.59	.55
Bare Ground	1.25	13.00	9.97	2.82	3.34

SOIL ANALYSIS DATA --  
 Herd Unit 17, Study no: 34, Maple Mountain Face

Effective rooting depth (in)	Temp °F (depth)	pH	Loam			%OM	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
27.4	51.2 (17.7)	6.3	45.8	30.4	23.8	2.2	13.6	188.8	.5

### Stoniness Index



PELLET GROUP DATA --  
 Management unit 17 , Study no: 34

Type	Quadrat Frequency		
	'97	'02	'07
Horse	-	-	3
Elk	4	-	10
Deer	1	2	16
Cattle	9	12	-

Days use per acre (ha)	
'02	'07
-	10 (24)
2 (5)	28 (69)
4 (10)	41 (101)
19 (47)	1 (2)

BROWSE CHARACTERISTICS --  
 Management unit 17 , Study no: 34

		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 vaseyana</i>												
83	<b>500</b>	-	-	300	200	-	60	20	40	-	0	23/32
89	<b>432</b>	-	-	66	366	-	0	15	85	-	15	13/16
97	<b>220</b>	200	220	-	-	60	0	0	0	-	0	13/18
02	<b>440</b>	20	-	440	-	-	5	0	0	-	0	20/27
07	<b>580</b>	1600	140	420	20	-	0	0	3	-	0	30/52
<i>Cercocarpus ledifolius</i>												
83	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
89	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
97	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
02	<b>0</b>	-	-	-	-	-	0	0	-	-	0	10/16
07	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
<i>Gutierrezia sarothrae</i>												
83	<b>33</b>	-	-	33	-	-	0	0	0	-	0	14/28
89	<b>166</b>	-	33	33	100	-	0	0	60	-	0	14/15
97	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
02	<b>0</b>	-	-	-	-	-	0	0	0	-	0	13/19
07	<b>40</b>	20	20	20	-	-	0	0	0	-	0	11/14
<i>Purshia tridentata</i>												
83	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
89	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
97	<b>120</b>	-	100	20	-	60	83	0	0	-	0	10/11
02	<b>140</b>	-	-	140	-	-	57	43	0	-	0	17/38
07	<b>140</b>	-	-	120	20	-	29	29	14	-	0	37/70

		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)
<b>Quercus gambelii</b>												
83	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
89	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
97	<b>280</b>	-	280	-	-	-	0	0	-	-	0	-/-
02	<b>360</b>	-	120	240	-	-	0	0	-	-	0	45/40
07	<b>180</b>	340	-	180	-	-	56	0	-	-	0	51/37
<b>Rhus trilobata</b>												
83	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
89	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
97	<b>40</b>	-	-	40	-	-	0	0	-	-	0	-/-
02	<b>40</b>	-	20	20	-	-	50	50	-	-	0	14/30
07	<b>20</b>	-	-	20	-	-	0	100	-	-	0	26/60