

Trend Study 21B-14-08

Study site name: Meadow Creek.

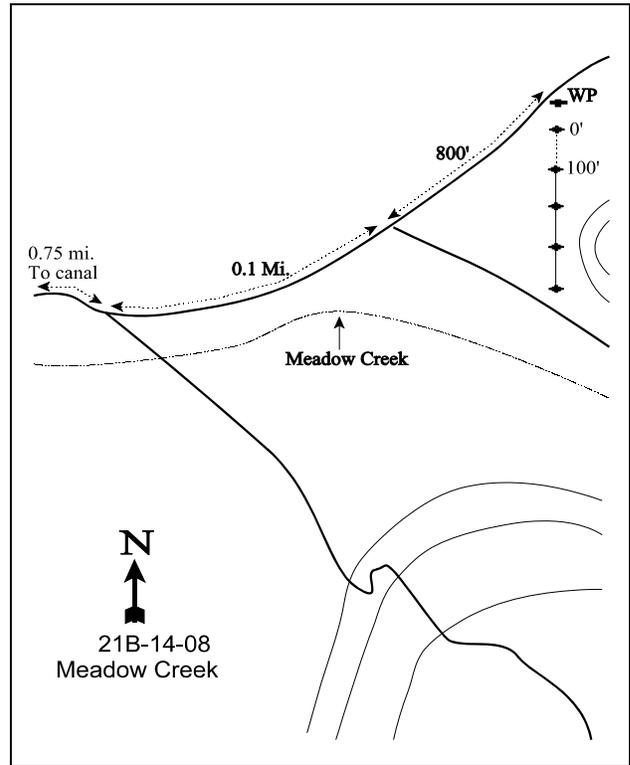
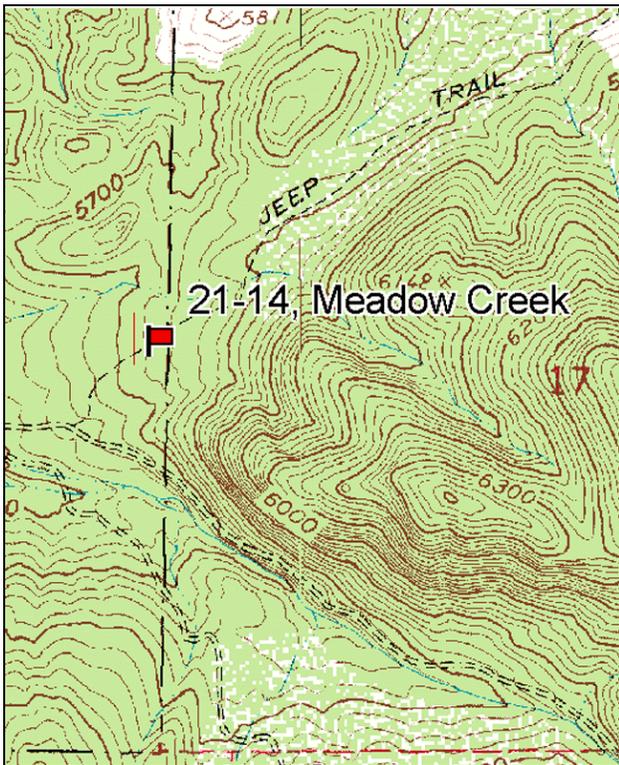
Vegetation type: Chained, Seeded P-J.

Compass bearing: frequency baseline 180 degrees magnetic.

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

LOCATION DESCRIPTION

From the corner of 100 North and 200 East in Meadow, travel 0.5 miles north to the Meadow Creek Road. Turn right and go 2.75 miles east. Drive across the canal and continue 0.75 miles to a fork in the road. Turn left and go 0.1 miles to another fork. Turn left and drive up about 0.15 miles (800 feet) to a rebar witness post on the right side of the road. The baseline starts 100 feet south of the witness post. The 0-foot baseline stake is a rebar with browse tag #7110 attached.



Map Name: Fillmore

Diagrammatic Sketch

Township 22S, Range 4W, Section 17

GPS: NAD 83, UTM 12S 383982 E, 4306364 N

DISCUSSION

Meadow Creek - Trend Study No. 21B-14

Study Information

This study samples critical deer winter range on BLM land located on the foothills at the mouth of Meadow Canyon [elevation: 5,710 feet (1,740 m), slope: 4%-8%, aspect: west]. The area was two-way chained and seeded in 1966, but Utah juniper (*Juniperus osteosperma*) has returned and dominates the overstory. Deer use throughout the area has been moderate to heavy for decades. This is documented by pellet group counts at the DWR Meadow Creek pellet group transect, which had an average of 61 deer days use/acre (151 ddu/ha) between 1980 and 1985 (Jense et al. 1985). This trend continued with deer use increasing slightly to 67 days use/acre (165 ddu/ha) between 1985 and 1990 (Jense et al. 1990). Two deer carcasses were found on the study during the 1985 sampling. Pellet group data collected on the study estimated deer use at 56 days use/acre (138 ddu/ha) in 1998, 71 days use/acre (175 ddu/ha) in 2003, and 119 days use/acre (294 ddu/ha) in 2008. Cattle use was estimated at 8 days use/acre (20 cdu/ha) in 1998 and 4 days use/acre (9 cdu/ha) in 2003. Cattle pats were noted in 2008, but were greater than one year old.

Soil

The soil is classified within the Current Spring series (USDA-NRCS 2008). This series consists of very deep, well-drained, slowly permeable soils that formed in alluvium primarily from quartzite, conglomerate, and limestone. The soil is a sandy clay loam with a slightly acidic reaction (pH 6.3). Phosphorus is marginal for plant growth and development at 7.6 ppm (Tiedemann and Lopez 2004). Relative combined vegetation and litter cover has ranged from 71% to 77% since 1998, while relative combined rock and pavement cover was low at 6%-9%. However, the upper layers of the profile are very rocky. Relative bare ground cover has been 14%-23% since 1998. The soil erosion condition was classified as stable in 2003 and 2008.

Browse

Preferred browse is provided by mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), Stansbury cliffrose (*Cowania mexicana* ssp. *stansburiana*), antelope bitterbrush (*Purshia tridentata*), and Gambel oak (*Quercus gambelii*). Scattered Utah serviceberry (*Amelanchier utahensis*), true mountain mahogany (*Cercocarpus montanus*), and Mormon tea (*Ephedra viridis*) are also present. Mountain big sagebrush cover decreased from 9% in 1998 to 3% in 2008. Density also decreased from 1,640 plants/acre in 1998 to 980 plants/acre in 2008. Decadence increased from 0% of the population to 57% in 2003, then decreased slightly to 47% in 2008. Young recruitment decreased from 96% of the population in 1985 to 0% in 2003, and increased slightly to 2% in 2008. Population vigor steadily declined from all of the sampled plants being vigorous in 1985 to 35% showing poor vigor in 2008. Annual leader growth averaged 1.0 inch (2.5 cm) in 2003 and 0.9 inch (2.3 cm) in 2008.

Stansbury cliffrose quadrat cover was 2% in 1998 and less than 1% in 2003 and 2008. Density has been low at 20-120 plants/acre since 1998. The population was made up of young and mature plants from 1985 to 1998. Decadent plants were not sampled until 2003, and comprised 83% and 100% of the sampled plants in 2003 and 2008, respectively. Vigor has been good throughout the population each sample year except 2003, when 17% of the population was classified as having poor vigor. Average annual leader growth was 3.0 inches (7.6 cm) in 2003 and 2.0 inches (5.1 cm) in 2008.

Antelope bitterbrush was sampled for the first time in 1998 when the baseline was lengthened. It has provided less than 1% quadrat cover since 1998, and density has been low at 40-100 plants/acre. All of the live sampled plants have been mature, and vigor has been excellent. Average annual leader growth was 2.1 inches (5.3 cm) in 2003.

Utah juniper canopy cover increased from 17% in 1998 to 32% by 2008. Point-centered quarter data estimated

density at 354 trees/acre in 2003 and 370 trees/acre in 2008. Average trunk diameter was approximately 6.4 inches (16.3 cm) in 2003 and 2008. The majority of the trees sampled since 2003 have been greater than 4 feet (1.2 m) tall.

Herbaceous Understory

Total grass cover was 14% in 1998, 7% in 2003, and 8% in 2008. Perennial species have provided the majority of this cover each year. Crested wheatgrass (*Agropyron cristatum*), bluebunch wheatgrass (*Agropyron spicatum*), Sandberg bluegrass (*Poa secunda*), and bottlebrush squirreltail (*Sitanion hystrix*) are the most abundant perennial grasses. Bulbous bluegrass (*Poa bulbosa*) was sampled in 2003, but only in 2% of the quadrats. Cheatgrass has provided 18%-19% of the total grass cover since 1998.

The forb component is dominated by annuals. Total forb cover was 3% in 1998 and 1% in 2003 and 2008. Pale alyssum (*Alyssum alyssoides*) has provided 65%-87% of the total forb cover since 1998. Holosteum (*Holosteum umbellatum*) and bur buttercup (*Ranunculus testiculatus*) have also been relatively abundant.

1991 TREND ASSESSMENT

The browse trend is stable. Sagebrush density decreased from 13,600 plants/acre to 7,399 plants/acre. However, 96% of the population in 1985 was young, and the decrease in density in 1991 was attributed to self-thinning as plants grew to maturity. Young recruitment remained high in 1991 at 22% of the population. Decadence increased slightly from 0% of the population to 6%, and plants exhibiting poor vigor also increased slightly from 0% of the population to 4%. Cliffrose density remained stable at 199 plants/acre, and the few sampled plants were either young or mature. Vigor remained good on all plants. The trend for grass is stable. The sum of nested frequency for perennial grasses changed little. The trend for forbs is stable. Few perennial forbs were sampled.

browse - stable (0)

grass - stable (0)

forb - stable (0)

1998 TREND ASSESSMENT

The browse trend is stable. Density changes may have been related to the larger sample area in 1998, therefore, the trend was determined using other parameters. Sagebrush decadence increased from 6% of the population to 18%, and young recruitment decreased from 22% of the population to 5%. Plants displaying poor vigor increased from 4% of the population to 11%. Cliffrose decadence and young recruitment remained relatively stable, and vigor remained good. The trend for grass is stable. The sum of nested frequency for perennial grasses changed little. The trend for forbs is stable. Few perennial forbs were sampled. The winter range condition, determined by the Desirable Components Index (DCI), was rated as fair due to moderate preferred browse and perennial grass cover and low perennial forb cover.

winter range condition (DCI) - fair (57) Mid-level potential scale

browse - stable (0)

grass - stable (0)

forb - stable (0)

2003 TREND ASSESSMENT

The browse trend is slightly down. Sagebrush density decreased 21%, and decadence increased from 18% of the population to 57%. No young plants were sampled. Plants displaying poor vigor increased from 11% of the population to 28%. Cliffrose density increased two-fold, but decadence increased from 0% of the population to 83%. No young plants were sampled, and plants displaying poor vigor increased from 0% of the population to 17%. Bitterbrush and Gambel oak densities increased slightly and remained vigorous. The trend for grass is stable. The sum of nested frequency for perennial grasses, excluding bulbous bluegrass, changed little. Sandberg bluegrass increased significantly in nested frequency, while that for crested wheatgrass and cheatgrass decreased significantly. The trend for forbs is stable. Few perennial forbs were sampled. Pale alyssum decreased significantly in nested frequency, while holosteum and bur buttercup increased significantly in nested frequency. The DCI rating declined to very poor due to an increase in decadence and

decrease in young recruitment of preferred browse, as well as a decrease in perennial grass cover.

winter range condition (DCI) - very poor (24) Mid-level potential scale
browse - slightly down (-1) grass - stable (0) forb - stable (0)

2008 TREND ASSESSMENT

The trend for browse is down. Sagebrush density decreased 25%, and decadence remained high at 47% of the population. Young recruitment remained low at 2% of the population, and plants exhibiting poor vigor increased from 28% of the population to 35%. Cliffrose density decreased 83%, and decadence remained high. No young plants were sampled. Bitterbrush density decreased 60%, while oak density increased 30%. Oak decadence increased from 5% of the population to 15%, and young recruitment also increased from 23% of the population to 56%. The trend for grass is stable. The sum of nested frequency for perennial grasses decreased 8%, and cheatgrass increased significantly in nested frequency. The trend for forbs is stable. The sum of nested frequency for perennial forbs changed little. Pale alyssum and rockcress (*Arabis* sp.) increased significantly in nested frequency, while blue-eyed Mary (*Collinsia parviflora*) decreased significantly in nested frequency. The DCI rating remained very poor.

winter range condition (DCI) - very poor (28) Mid-level potential scale
browse - down (-2) grass - stable (0) forb - stable (0)

HERBACEOUS TRENDS --
 Management unit 21B, Study no: 14

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'98	'03	'08	'98	'03	'08
G	Agropyron cristatum	_a 101	_{ab} 111	_b 147	_a 92	_a 110	7.93	2.69	3.97
G	Agropyron intermedium	-	-	-	-	-	-	-	.03
G	Agropyron smithii	-	2	-	3	-	-	.15	-
G	Agropyron spicatum	_b 102	_{ab} 89	_{ab} 66	_a 58	_a 54	2.36	1.71	1.60
G	Bouteloua gracilis	3	-	-	-	-	-	-	-
G	Bromus japonicus (a)	-	-	_a 6	_a 5	_b 16	.03	.03	.45
G	Bromus tectorum (a)	-	-	_b 191	_a 142	_b 190	2.62	1.34	1.39
G	Festuca myuros (a)	-	-	-	3	-	-	.00	-
G	Poa bulbosa	-	-	-	4	-	-	.06	-
G	Poa fendleriana	-	3	1	2	-	.03	.00	-
G	Poa secunda	_a 15	_{ab} 31	_{ab} 31	_c 85	_{bc} 62	.39	1.08	.36
G	Sitanion hystrix	13	3	5	6	1	.21	.01	.03
G	Vulpia octoflora (a)	-	-	_b 12	_a -	_a -	.05	-	-
Total for Annual Grasses		0	0	209	150	206	2.70	1.38	1.85
Total for Perennial Grasses		234	239	250	250	227	10.93	5.73	6.00
Total for Grasses		234	239	459	400	433	13.64	7.11	7.85
F	Alyssum alyssoides (a)	-	-	_b 222	_a 158	_b 241	2.38	.77	1.02
F	Allium sp.	-	-	-	10	-	-	.01	-
F	Arabis sp.	_Λ -	_a 2	_a 2	_a 1	_b 14	.03	.00	.05

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'98	'03	'08	'98	'03	'08
F	Astragalus sp.	-	-	-	-	-	.00	-	-
F	Calochortus nuttallii	-	5	-	2	-	-	.00	-
F	Collinsia parviflora (a)	-	-	_a -	_b 20	_a 3	-	.04	.00
F	Cryptantha sp.	-	-	3	-	-	.15	-	-
F	Descurainia pinnata (a)	-	-	5	3	-	.04	.00	-
F	Draba sp. (a)	-	-	_{ab} 13	_b 14	_a -	.04	.03	-
F	Galium sp.	-	-	-	6	-	-	.02	-
F	Holosteum umbellatum (a)	-	-	_b 11	_c 29	_a -	.02	.14	-
F	Microsteris gracilis (a)	-	-	21	5	14	.04	.01	.04
F	Phlox longifolia	-	3	-	3	8	-	.01	.07
F	Plantago patagonica (a)	-	-	3	-	1	.00	-	.00
F	Polygonum douglasii (a)	-	-	-	-	3	-	-	.00
F	Ranunculus testiculatus (a)	-	-	_a 2	_b 32	_{ab} 23	.01	.11	.04
F	Tragopogon dubius	6	-	-	-	-	-	-	-
F	Unknown forb-perennial	2	-	-	-	-	-	-	-
F	Zigadenus paniculatus	-	3	-	-	2	-	-	.00
Total for Annual Forbs		0	0	277	261	285	2.54	1.13	1.11
Total for Perennial Forbs		8	13	5	22	24	0.19	0.05	0.12
Total for Forbs		8	13	282	283	309	2.74	1.19	1.24

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

BROWSE TRENDS --

Management unit 21B, Study no: 14

Type	Species	Strip Frequency			Average Cover %		
		'98	'03	'08	'98	'03	'08
B	<i>Artemisia tridentata vaseyana</i>	45	44	40	8.82	7.20	3.00
B	<i>Chrysothamnus nauseosus hololeucus</i>	7	1	0	1.67	.03	-
B	<i>Chrysothamnus viscidiflorus stenophyllus</i>	0	0	1	-	-	.15
B	<i>Cowania mexicana stansburiana</i>	2	3	1	1.62	.59	.38
B	<i>Gutierrezia sarothrae</i>	10	1	4	.01	.00	.15
B	<i>Juniperus osteosperma</i>	16	20	20	12.07	14.86	17.45
B	<i>Opuntia sp.</i>	1	1	1	.00	.00	.00
B	<i>Pinus edulis</i>	0	0	0	-	-	.15
B	<i>Purshia tridentata</i>	2	2	1	.15	.63	.53
B	<i>Quercus gambelii</i>	6	5	5	2.38	1.14	1.18
Total for Browse		89	77	73	26.76	24.46	23.00

CANOPY COVER, LINE INTERCEPT --

Management unit 21B, Study no: 14

Species	Percent Cover	
	'03	'08
<i>Artemisia tridentata vaseyana</i>	5.09	3.54
<i>Chrysothamnus nauseosus hololeucus</i>	.10	-
<i>Chrysothamnus viscidiflorus stenophyllus</i>	.01	.20
<i>Cowania mexicana stansburiana</i>	2.70	1.04
<i>Juniperus osteosperma</i>	24.29	32.25
<i>Opuntia sp.</i>	.03	.03
<i>Purshia tridentata</i>	.21	.90
<i>Quercus gambelii</i>	2.70	2.43

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 21B, Study no: 14

Species	Average leader growth (in)	
	'03	'08
Artemisia tridentata vaseyana	1.0	0.9
Cowania mexicana stansburiana	3.0	2.0

POINT-QUARTER TREE DATA --

Management unit 21B, Study no: 14

Species	Trees per Acre			Average diameter (in)		
	'98	'03	'08	'98	'03	'08
Juniperus osteosperma	367	354	370	3.6	6.4	6.3

BASIC COVER --

Management unit 21B, Study no: 14

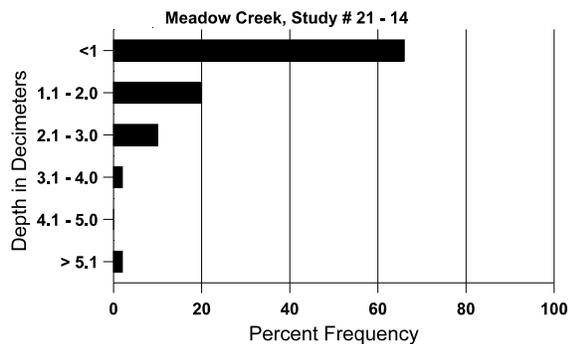
Cover Type	Average Cover %				
	'85	'91	'98	'03	'08
Vegetation	11.00	11.75	42.72	35.57	33.05
Rock	3.75	4.50	5.43	4.32	5.36
Pavement	4.25	6.50	6.07	2.23	3.74
Litter	63.50	61.25	55.46	49.52	61.42
Cryptogams	2.25	1.00	3.31	.81	1.75
Bare Ground	15.25	15.00	18.19	26.92	16.92

SOIL ANALYSIS DATA --

Management unit 21, Study no: 14, Study Name: Meadow Creek

Effective rooting depth (in)	Temp °F (depth)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
			% sand	% silt	% clay				
13.2	73.0 (8.7)	6.3	58.0	17.4	24.6	2.4	7.6	118.4	0.8

Stoniness Index



PELLET GROUP DATA --

Management unit 21B, Study no: 14

Type	Quadrat Frequency		
	'98	'03	'08
Rabbit	46	11	31
Deer	22	16	34
Cattle	1	3	3

Days use per acre (ha)		
'98	'03	'08
-	-	-
56 (138)	71 (175)	119 (294)
8 (20)	4 (9)	-

BROWSE CHARACTERISTICS --

Management unit 21B, Study no: 14

		Age class distribution (plants per acre)					Utilization					
Y	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Amelanchier utahensis</i>												
85	0	-	-	-	-	-	0	0	-	-	0	-/-
91	0	-	-	-	-	-	0	0	-	-	0	-/-
98	0	-	-	-	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	-/-
08	0	-	-	-	-	-	0	0	-	-	0	68/54
<i>Artemisia tridentata vaseyana</i>												
85	13598	1666	12999	599	-	-	.98	0	0	-	0	15/18
91	7398	-	1599	5333	466	-	10	7	6	.81	4	6/6
98	1640	20	80	1260	300	440	15	2	18	9	11	25/37
03	1300	-	-	560	740	420	14	2	57	26	28	22/32
08	980	20	20	500	460	560	27	0	47	35	35	22/33
<i>Cercocarpus montanus</i>												
85	66	-	-	66	-	-	0	100	-	-	0	25/30
91	66	-	66	-	-	-	0	100	-	-	0	-/-
98	0	-	-	-	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	88/83
08	0	-	-	-	-	-	0	0	-	-	0	68/80
<i>Chrysothamnus nauseosus hololeucus</i>												
85	865	-	66	266	533	-	54	0	62	-	15	13/16
91	333	-	-	-	333	-	40	0	100	18	60	-/-
98	160	-	20	20	120	20	0	0	75	38	38	27/35
03	20	-	-	-	20	20	0	0	100	100	100	23/10
08	0	-	-	-	-	-	0	0	0	-	0	16/24

		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>Chrysothamnus viscidiflorus stenophyllus</i>												
85	331	-	66	199	66	-	0	0	20	-	20	8/13
91	465	-	66	333	66	-	0	0	14	-	0	14/12
98	0	-	-	-	-	-	0	0	0	-	0	-/-
03	0	-	-	-	-	-	0	0	0	-	0	10/12
08	20	-	-	-	20	-	0	0	100	100	100	-/-
<i>Cowania mexicana stansburiana</i>												
85	199	-	66	133	-	-	67	33	0	-	0	20/28
91	199	-	133	66	-	-	67	0	0	-	0	35/39
98	40	-	20	20	-	40	0	0	0	-	0	55/63
03	120	-	-	20	100	-	17	0	83	17	17	67/64
08	20	-	-	-	20	20	100	0	100	-	0	67/63
<i>Ephedra viridis</i>												
85	0	-	-	-	-	-	0	0	-	-	0	-/-
91	0	-	-	-	-	-	0	0	-	-	0	-/-
98	0	-	-	-	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	26/71
08	0	-	-	-	-	-	0	0	-	-	0	42/79
<i>Gutierrezia sarothrae</i>												
85	6998	399	2466	4133	399	-	0	0	6	-	.95	8/9
91	2131	-	199	1666	266	-	0	0	12	.93	3	8/7
98	260	20	20	240	-	-	0	0	0	-	0	6/7
03	20	-	-	20	-	20	0	0	0	-	0	8/10
08	80	-	-	60	20	-	0	0	25	25	25	9/14
<i>Juniperus osteosperma</i>												
85	465	-	199	266	-	-	0	0	-	-	0	64/69
91	532	-	133	399	-	-	13	0	-	-	13	121/91
98	380	-	80	300	-	60	0	0	-	-	0	-/-
03	500	-	-	500	-	-	0	0	-	-	0	-/-
08	500	-	80	420	-	20	0	0	-	-	0	-/-
<i>Opuntia sp.</i>												
85	531	-	199	66	266	-	0	0	50	-	38	5/9
91	465	66	199	266	-	-	0	0	0	-	0	3/4
98	20	-	-	20	-	-	0	0	0	-	0	8/13
03	20	-	-	20	-	-	0	0	0	-	0	7/14
08	20	-	-	20	-	-	0	0	0	-	0	7/16

		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)
Purshia tridentata												
85	0	-	-	-	-	-	0	0	-	-	0	-/-
91	0	-	-	-	-	-	0	0	-	-	0	-/-
98	60	-	-	60	-	-	100	0	-	-	0	35/58
03	100	-	-	100	-	40	0	0	-	-	0	28/42
08	40	-	-	40	-	-	0	100	-	-	0	33/62
Quercus gambelii												
85	0	-	-	-	-	-	0	0	0	-	0	-/-
91	0	-	-	-	-	-	0	0	0	-	0	-/-
98	780	-	360	420	-	-	0	0	0	-	0	43/29
03	800	-	180	580	40	-	0	0	5	-	0	35/26
08	1040	-	580	300	160	80	13	0	15	-	2	41/34