

ELK CAMP - TREND STUDY NO. 25A-18-09

Vegetation Type: Mixed Mountain Brush
Range Type: Crucial Deer Summer, Substantial Elk Winter
NRCS Ecological Site Description: Not Available
Land Ownership: USFS
Elevation: 8,700 ft (2,652 m)
Aspect: South
Slope: 30%-35% at 0' stake, 10%-15% further up the baseline.
Transect bearing: Line 1 - 170°M, Lines 2-4 - 352°M
Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft)

Directions:

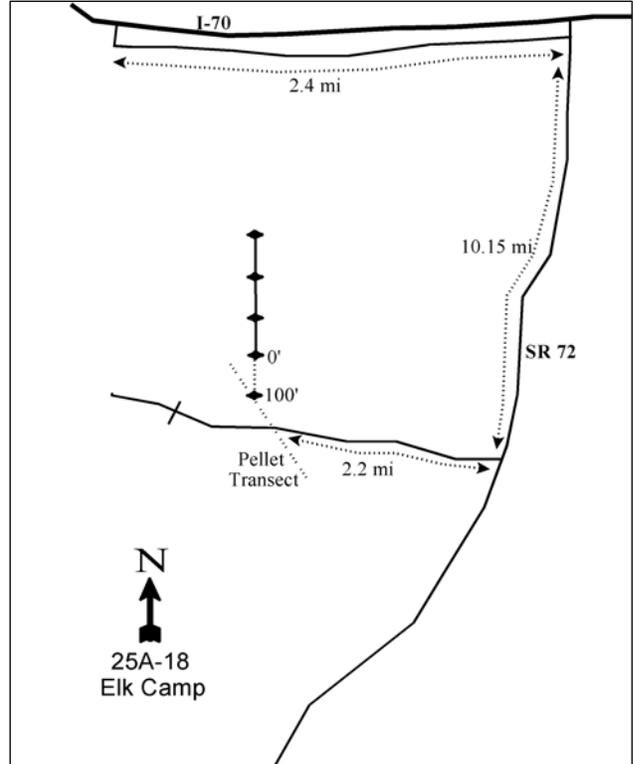
Go east from Salina on I-70 for approximately 37.5 miles to the rest area. From the exit, go 2.4 miles east on the frontage road to the junction with SR72. Travel south on SR 72 for 10.15 miles to a gravel road to the right with a sign for Last Chance Road. Turn and go 2 miles to the Elk Camp Road, and continue straight for another 0.2 miles. Stop here, approximately 90 yards short of a cattleguard, and look for a small yellow stake 10 feet off the south side of the road. The yellow pellet group transect stakes run northwest, with one stake every 30 feet. Follow the yellow stakes 90 feet up from the road to a large rebar which marks the 100-foot end of the frequency baseline. The 0-foot baseline stake is 100 feet north and is tagged #7040.

Map Name: John's Peak, Utah



Township: 25S, Range: 4E, Section: 9

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 458264 E 4278340 N

ELK CAMP - TREND STUDY NO. 25A-18

Site Information

Site Description: The study is located alongside a DWR pellet group transect on the south side of a hill overlooking Elk Campground and South Last Chance Creek. The surrounding gentle hills are covered by open sagebrush, grass slopes, scattered pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), and patches of aspen (*Populus tremuloides*). The vegetation community of the study site is a mixed mountain brush dominated by mountain big sagebrush (*Artemisia tridentata* ssp. *tridentata*). There was a prescribed burn in 1999 that was spotty over the area and affected one of the frequency/density belts. Pellet group counts demonstrate that deer use varies greatly from year to year (Jense et al. 1985, 1991). Elk use is low but it has increased steadily since 1980 (Jense et al. 1985, 1991). In the past, the area was grazed by sheep, but in 1978 the permits were converted to cattle and it became a part of the Last Chance Cattle Allotment (Fish Lake National Forest). However, sheep were noted on a hillside nearby the study transect in July of 1985. The area is within the Lower Last Chance pasture of the Last Chance allotment. Grazing use is light on the slope, but heavier in the valley below along the riparian corridor. Pellet group data taken along the study site baseline has estimated increasing deer use since 1999 and indicated very heavy use in 2009. Estimated elk use was moderate in 1999 and 2009, but no elk pellets were sampled in 2004. Estimated cattle use has been light since 1999 (Table - Pellet Group Data). A fawn that had recently died was found near the site in 1999.

Browse: There are several species of shrubs present on the site. The key browse species are black sagebrush (*Artemisia nova*), mountain big sagebrush, and bitterbrush (*Purshia tridentata*). Black sagebrush was the dominant browse species at the outset of the study in 1985, but has steadily decreased in density since 1999 while mountain big sagebrush has steadily increased in density (Table - Browse Characteristics) and cover over the same period. Mountain big sagebrush is now the dominant browse species in cover on the site (Table - Browse Trends). The mountain big sagebrush occurs in larger numbers further up the slope where it levels out and the soil is deeper. Both sagebrush populations consist of mostly mature plants that displayed moderate to high decadence in the early years of the study, but decadence had decreased and was more normal in 2009. Recruitment of young mountain big sagebrush plants has been very good over the sample years and utilization has been mostly moderate to heavy. Recruitment of young black sagebrush plants has been fairly poor over the course of the study and use of black sagebrush has decreased from moderate to heavy use in the early years of the study to light use in 2009. The most preferred browse on the site is bitterbrush which has a low spreading growth form on this site. Bitterbrush has been classified as heavily utilized each time this site has been sampled. This population has steadily declined in density since 1985. There is a variety of other browse on the site such as snowberry (*Symphoricarpos oreophilus*), gray horsebrush (*Tetradymia canescens*), Wood's rose (*Rosa woodsii*), broom snakeweed (*Gutierrezia sarothrae*), and stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*) (Table - Browse Characteristics).

Herbaceous Understory: The site supports a variety of grasses and forbs. The most abundant grasses include mutton bluegrass (*Poa fendleriana*), sedge (*Carex* sp.), Letterman needlegrass (*Stipa lettermani*), and blue grama (*Bouteloua gracilis*). Blue grama is abundant on the south facing slopes, while the sedge is abundant on the north facing slopes. Forbs are diverse but not very abundant. The more frequently encountered species are low growing and offer little forage.

Soil: Soil on the site is a loam with a slightly acid pH (Table - Soil Analysis Data). There are many large rocks on the surface and throughout the soil. These rocks are of volcanic origin, as is the soil. Infiltration of water is good, but minor sheet erosion has removed some of the top soil leaving an erosion pavement. Bare ground cover is moderately low, but has increased steadily since 1999. Pedestaling and terracing is evident on the steeper slopes but erosion is minimal and the soil erosion condition was classified as stable in 2004 and 2009.

Trend Assessments

Browse:

- **1985 to 1991 - slightly down (-1):** The density of bitterbrush decreased by 31% and decadence increased from 1% to 90%. Black sagebrush density decreased by 6% and decadence increased from 56% to 70%. Mountain big sagebrush density increased by more than two-fold, but decadence increased from 21% to 31%.
- **1991 to 1999 - slightly up (+1):** Differences in density may be related to the larger sample area used in 1999; therefore, trend was determined using other parameters. Decadence of the all three key species, mountain big sagebrush, black sagebrush, and bitterbrush, decreased substantially.
- **1999 to 2004 - slightly down (-1):** Density of all three key species decreased slightly with the largest decrease in the preferred browse species, bitterbrush. There was a slight increase in cover of all three species, but there was also a decrease in the recruitment of young plants in all three species. Recruitment was still good for mountain big sagebrush, but was poor for black sagebrush and bitterbrush. Broom snakeweed density increased more than three-fold.
- **2004 to 2009 - stable (0):** The density of bitterbrush decreased by 26% and cover decreased from 6% to 4%, but the density of mountain big sagebrush increased by 36%.

Grass:

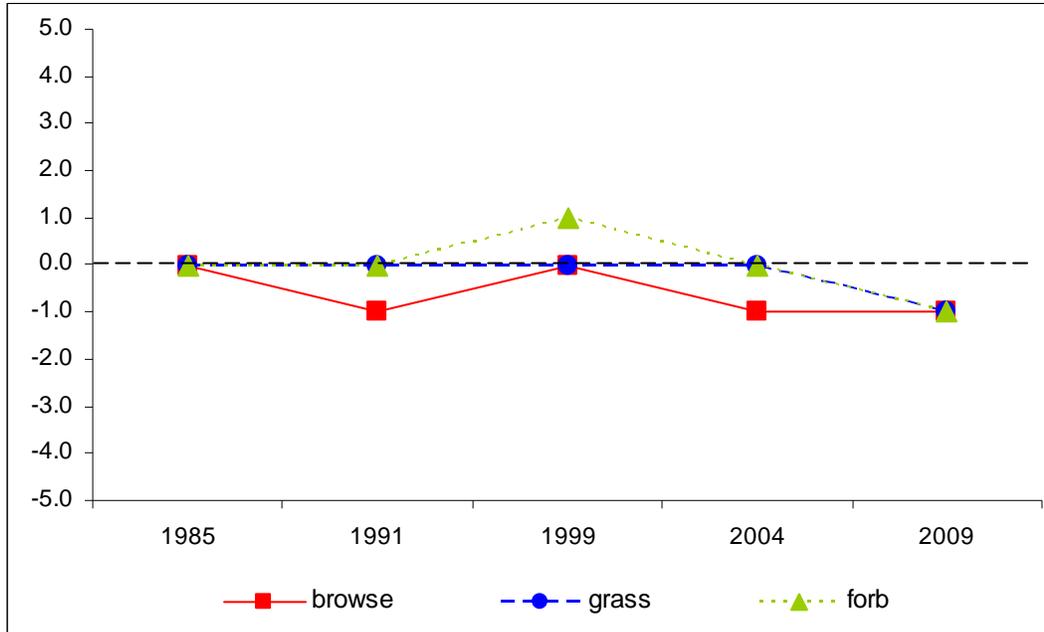
- **1985 to 1991 - stable (0):** There was little change in the sum of nested frequency or composition of perennial grasses.
- **1991 to 1999 - stable (0):** Perennial grass sum of nested frequency changed little.
- **1999 to 2004 - stable (0):** The sum of nested frequency and cover of perennial grasses remained similar.
- **2004 to 2009 - slightly down (-1):** There was an 18% decrease in the sum of nested frequency of perennial grasses and cover decreased from 11% to 8%. Sedge decreased significantly in nested frequency.

Forb:

- **1985 to 1991 - stable (0):** There was little change in the sum of nested frequency of perennial forbs.
- **1991 to 1999 - slightly up (+1):** The sum of nested frequency of perennial forbs increased by 13%.
- **1999 to 2004 - slightly down (-1):** The sum of nested frequency of perennial forbs decreased by 14%, though there was little change in cover.
- **2004 to 2009 - slightly down (-1):** Perennial forb sum of nested frequency decreased by 19% and cover decreased from 2% to 1%.

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
Management unit 25A Study no: 18



HERBACEOUS TRENDS--
Management unit 25A, Study no: 18

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
G	Agropyron smithii	a-	b13	b18	bc32	c51	.11	.25	.57
G	Bouteloua gracilis	b73	b76	b96	ab67	a37	3.65	2.12	.78
G	Carex sp.	ab112	a88	ab106	b147	a103	3.25	2.18	1.17
G	Festuca ovina	2	4	9	3	-	.09	.15	-
G	Poa fendleriana	b192	ab186	b194	a138	ab148	3.56	3.93	3.90
G	Sitanion hystrix	c83	c109	b47	ab32	a7	.42	.59	.15
G	Stipa comata	-	-	-	5	-	-	.07	-
G	Stipa lettermani	a20	ab46	ab46	b61	b53	.90	1.95	1.18
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		482	522	516	485	399	12.00	11.26	7.78
Total for Grasses		482	522	516	485	399	12.00	11.26	7.78
F	Agoseris glauca	a-	b14	a-	a-	a-	-	-	-
F	Allium sp.	-	2	7	11	-	.03	.02	-
F	Androsace septentrionalis (a)	-	-	5	-	-	.01	-	-
F	Antennaria rosea	bc23	a9	c36	ab18	ab15	.83	.78	.27
F	Arabis demissa	12	8	7	-	-	.18	-	-
F	Artemisia ludoviciana	2	3	-	-	-	-	-	-
F	Aster sp.	-	-	-	-	3	-	-	.00
F	Astragalus sp.	a-	a-	b22	a9	a6	.14	.05	.01
F	Castilleja chromosa	b13	b13	a-	a-	a-	-	-	-

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'99	'04	'09	'99	'04	'09
F	Chaenactis douglasii	2	-	-	3	3	-	.00	.00
F	Chenopodium sp. (a)	-	-	-	8	-	-	.05	-
F	Cirsium sp.	a ⁻	a ⁻	ab ⁴	b ⁷	a ²	.18	.09	.00
F	Collinsia parviflora (a)	-	-	9	-	-	.02	-	-
F	Comandra pallida	-	-	5	7	3	.06	.04	.01
F	Cryptantha sp.	-	2	-	-	-	-	-	-
F	Erigeron eatonii	-	-	-	5	4	-	.03	.01
F	Erigeron pumilus	-	-	6	8	10	.18	.04	.05
F	Eriogonum racemosum	25	34	24	31	26	.27	.52	.12
F	Eriogonum umbellatum	b ¹⁶	ab ¹¹	ab ⁴	a ⁻	a ³	.01	-	.03
F	Gayophytum ramosissimum(a)	-	-	-	5	-	-	.03	-
F	Hymenoxys richardsonii	b ¹⁸	a ⁷	a ⁻	a ⁻	a ⁻	-	.00	-
F	Lappula occidentalis (a)	-	-	-	4	-	-	.01	-
F	Lithospermum incisum	-	3	-	1	-	-	.03	-
F	Lupinus argenteus	-	-	-	2	1	-	.03	.00
F	Machaeranthera canescens	ab ¹¹	a ³	ab ¹²	b ¹⁵	a ⁻	.05	.17	-
F	Machaeranthera grindelioides	a ⁻	a ⁻	a ⁻	a ²	b ¹³	-	.03	.13
F	Penstemon sp.	-	2	10	5	3	.05	.01	.01
F	Phlox austromontana	a ⁻	a ⁻	b ³²	b ²⁴	b ³⁰	.35	.48	.38
F	Phlox longifolia	b ¹⁹	c ⁴⁸	a ⁴	a ⁶	a ²	.01	.01	.03
F	Polygonum douglasii (a)	-	-	a ¹	b ¹⁸	a ⁻	.00	.05	-
F	Senecio multilobatus	2	-	7	-	2	.04	-	.00
F	Sphaeralcea coccinea	6	3	3	-	-	.00	-	-
F	Unknown forb-perennial	b ¹⁴	a ⁻	a ⁻	a ³	a ¹	-	.03	.03
F	Zigadenus paniculatus	3	-	-	-	-	-	-	-
Total for Annual Forbs		0	0	15	35	0	0.03	0.15	0
Total for Perennial Forbs		166	162	183	157	127	2.42	2.39	1.11
Total for Forbs		166	162	198	192	127	2.46	2.55	1.11

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

BROWSE TRENDS--

Management unit 25A, Study no: 18

Type	Species	Strip Frequency			Average Cover %		
		'99	'04	'09	'99	'04	'09
B	<i>Artemisia frigida</i>	4	5	2	.00	.06	.15
B	<i>Artemisia nova</i>	52	51	41	5.33	5.49	3.75
B	<i>Artemisia tridentata vaseyana</i>	58	61	61	7.46	9.98	10.09
B	<i>Chrysothamnus nauseosus hololeucus</i>	7	13	3	.48	.51	.04
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	69	69	65	3.28	7.94	4.53
B	<i>Coryphantha vivipara</i>	2	2	0	.00	.00	-
B	<i>Gutierrezia sarothrae</i>	12	28	26	.70	1.05	1.00
B	<i>Mahonia repens</i>	7	9	7	.04	.15	.05
B	<i>Opuntia sp.</i>	0	3	4	-	.00	.06
B	<i>Pediocactus simpsonii</i>	0	5	2	-	.00	.00
B	<i>Pinus edulis</i>	3	4	3	2.51	1.69	2.67
B	<i>Purshia tridentata</i>	49	46	35	6.53	5.57	3.84
B	<i>Rosa woodsii</i>	17	12	11	1.89	.69	.34
B	<i>Symphoricarpos oreophilus</i>	23	27	22	.75	.88	1.54
B	<i>Tetradymia canescens</i>	11	15	6	.06	.09	.53
Total for Browse		314	350	288	29.08	34.14	28.62

CANOPY COVER, LINE INTERCEPT--

Management unit 25A, Study no: 18

Species	Percent Cover		
	'99	'04	'09
<i>Artemisia frigida</i>	-	.11	-
<i>Artemisia nova</i>	-	5.73	3.81
<i>Artemisia tridentata vaseyana</i>	-	9.53	12.91
<i>Chrysothamnus nauseosus hololeucus</i>	-	.68	.28
<i>Chrysothamnus viscidiflorus viscidiflorus</i>	-	7.61	1.78
<i>Gutierrezia sarothrae</i>	-	.95	1.68
<i>Mahonia repens</i>	-	.13	-
<i>Opuntia sp.</i>	-	-	.01
<i>Pinus edulis</i>	4.19	4.30	4.11
<i>Purshia tridentata</i>	-	8.36	6.00
<i>Rosa woodsii</i>	-	1.26	.33
<i>Symphoricarpos oreophilus</i>	-	2.38	2.23
<i>Tetradymia canescens</i>	-	.75	.23

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 25A, Study no: 18

Species	Average leader growth (in)	
	'04	'09
Artemisia tridentata vaseyana	2.9	1.3
Purshia tridentata	6.2	1.2

POINT-QUARTER TREE DATA--

Management unit 25A, Study no: 18

Species	Trees per Acre			Average diameter (in)		
	'99	'04	'09	'99	'04	'09
Juniperus scopulorum	10	24	25	3.8	3.8	4.7
Pinus edulis	10	26	23	3.8	6.4	2.1

BASIC COVER--

Management unit 25A, Study no: 18

Cover Type	Average Cover %				
	'85	'91	'99	'04	'09
Vegetation	5.50	13.00	42.04	45.70	37.63
Rock	17.25	21.50	15.66	16.39	13.93
Pavement	7.00	.75	2.48	3.81	2.59
Litter	60.75	44.25	33.96	31.74	37.47
Cryptogams	.25	0	.06	.04	.03
Bare Ground	9.25	20.50	14.08	19.52	24.99

SOIL ANALYSIS DATA --

Management unit 25A, Study no: 18, Study Name: Elk Camp

Effective rooting depth (in)	pH	loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
11	6.5	50.9	29.8	19.3	3	16.8	211.2	0.5

PELLET GROUP DATA--

Management unit 25A, Study no: 18

Type	Quadrat Frequency			Days use per acre (ha)		
	'99	'04	'09	'99	'04	'09
Sheep	-	-	1	-	-	-
Rabbit	23	27	20	-	-	-
Elk	18	4	7	21 (52)	-	39 (96)
Deer	27	49	21	53 (130)	66 (162)	105 (260)
Cattle	4	1	6	11 (27)	4 (9)	2 (5)

BROWSE CHARACTERISTICS--
Management unit 25A, Study no: 18

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Amelanchier utahensis</i>									
85	0	0	0	-	-	0	0	0	-/-
91	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	16/17
<i>Artemisia frigida</i>									
85	665	10	90	-	-	0	0	0	3/2
91	0	0	0	-	-	0	0	0	-/-
99	120	33	67	-	-	33	0	0	3/8
04	240	8	92	-	-	50	8	0	6/7
09	100	0	100	-	-	0	0	0	4/6
<i>Artemisia nova</i>									
85	8531	12	31	56	199	47	3	11	10/16
91	7998	6	24	70	-	37	44	13	11/16
99	3560	10	69	21	60	35	7	2	10/20
04	3200	4	70	26	300	23	13	10	9/19
09	3020	10	81	9	40	0	0	7	10/19
<i>Artemisia tridentata vaseyana</i>									
85	931	36	43	21	66	57	0	7	18/20
91	1931	34	34	31	66	52	7	17	22/23
99	2740	23	61	15	180	44	3	7	27/37
04	2600	18	64	18	13140	40	22	9	19/31
09	3540	29	65	6	420	18	2	3	18/30
<i>Chrysothamnus nauseosus hololeucus</i>									
85	66	0	0	100	-	0	100	0	-/-
91	0	0	0	0	-	0	0	0	-/-
99	280	7	93	0	-	7	21	0	9/13
04	360	0	100	0	-	39	0	0	12/18
09	80	25	75	0	-	0	0	0	10/7
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
85	8065	23	76	1	66	0	0	0	5/10
91	10865	25	71	4	-	31	21	.61	3/7
99	4060	12	85	2	-	5	1	.98	6/12
04	6440	2	97	1	-	0	0	.31	9/15
09	5020	16	84	0	-	0	0	.79	7/13

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Coryphantha vivipara</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	40	0	100	-	-	0	0	0	3/2	
04	40	0	100	-	-	0	0	0	2/3	
09	0	0	0	-	-	0	0	0	-/-	
<i>Eriogonum microthecum</i>										
85	133	0	100	-	-	0	0	0	1/4	
91	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	-/-	
<i>Gutierrezia sarothrae</i>										
85	0	0	0	0	-	0	0	0	-/-	
91	0	0	0	0	-	0	0	0	-/-	
99	580	0	100	0	-	0	0	0	5/7	
04	1860	0	100	0	-	0	0	0	9/10	
09	1160	3	95	2	-	5	0	2	6/8	
<i>Juniperus scopulorum</i>										
85	66	0	100	-	-	0	0	0	46/41	
91	66	100	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	-/-	
<i>Mahonia repens</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	780	18	82	-	-	0	0	0	2/2	
04	1100	0	100	-	-	0	0	0	3/4	
09	520	0	100	-	-	0	0	0	2/3	
<i>Opuntia sp.</i>										
85	599	11	89	0	-	0	0	0	2/1	
91	398	17	67	17	-	0	0	0	2/5	
99	0	0	0	0	-	0	0	0	2/5	
04	80	50	50	0	-	0	0	0	3/8	
09	80	0	100	0	-	0	0	0	3/7	
<i>Pediocactus simpsonii</i>										
85	0	0	0	-	-	0	0	0	-/-	
91	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	120	67	33	-	-	0	0	0	3/5	
09	40	0	100	-	-	0	0	0	3/5	

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
Pinus edulis									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
99	60	33	67	-	-	0	0	0	-/-
04	80	50	50	-	-	0	0	0	-/-
09	60	67	33	-	-	0	0	0	-/-
Purshia tridentata									
85	5598	42	57	1	333	30	46	0	13/21
91	3865	0	10	90	-	2	97	40	6/16
99	2560	14	80	5	20	32	57	3	13/29
04	2060	5	86	9	-	9	90	7	13/31
09	1520	5	91	4	-	32	57	39	10/26
Rosa woodsii									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
99	1480	42	58	-	60	0	0	0	12/14
04	1320	3	97	-	-	0	0	0	8/8
09	760	32	68	-	-	5	21	0	10/9
Symphoricarpos oreophilus									
85	865	31	69	0	-	38	0	0	18/16
91	1265	11	84	5	-	11	53	0	19/16
99	560	18	82	0	20	39	18	0	18/30
04	800	13	88	0	20	8	0	0	16/32
09	640	9	91	0	-	3	0	16	15/31
Tetradymia canescens									
85	398	17	33	50	-	17	0	0	7/5
91	465	14	29	57	-	14	43	29	13/10
99	260	8	62	31	-	54	0	8	10/10
04	320	19	81	0	-	38	6	0	11/12
09	120	0	100	0	-	0	0	0	9/11
Yucca sp.									
85	0	0	0	-	-	0	0	0	-/-
91	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	7/9
09	0	0	0	-	-	0	0	0	7/6