

Trend Study 30-13-08

Study site name: Black Ridge .

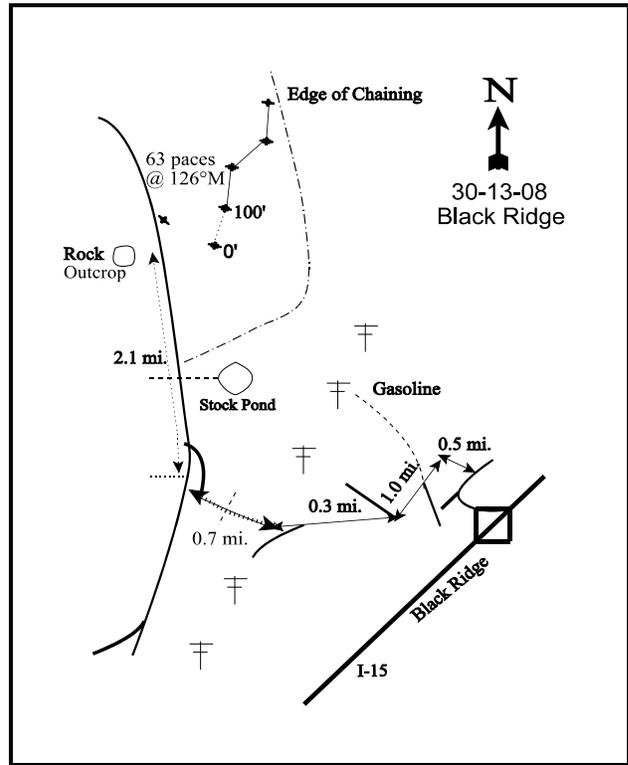
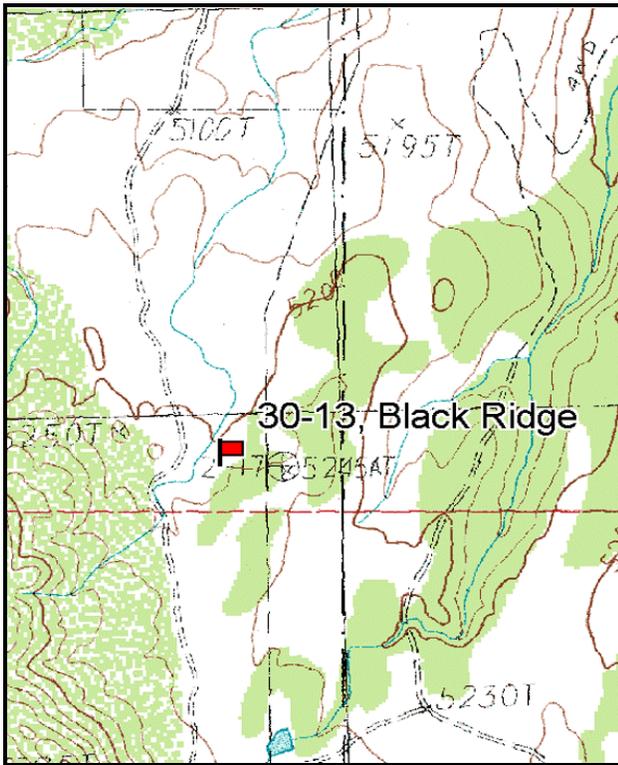
Vegetation type: Chained, seeded P-J .

Compass bearing: frequency baseline 2 degrees magnetic.

Frequency belt placement: line 1 (15 & 84ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). No rebar.

LOCATION DESCRIPTION

Traveling south on I-15 from Cedar City, take the Black Ridge exit (exit #36). Go west for a short distance to a frontage road. Turn north (right) on the frontage road and then take the first left turn onto Escalante's Path in the Kolob Estates heading west. Travel 0.5 miles and take a left turn onto a dirt road. Continue on this dirt road, keeping to the right at the fork. After approximately 1 mile, you will come to a corral. Stay to the left and continue on this road for 0.3 miles and turn right at the intersection at the power lines. Proceed on this road for another 0.7 miles, at which point there will be another intersection. Turn right at the intersection and travel 2.1 miles, then stop. On the left side of the road is a large rock outcrop. On the right side of the road is a witness post. The 0-foot baseline stake is located 63 paces at a bearing of 126 degrees magnetic from the witness post. The study is marked by green steel "T" fence posts approximately 18 to 24 inches in height. The 0-foot baseline stake is marked with a browse tag #7003.



Map Name: New Harmony

Diagrammatic Sketch

Township 39S, Range 13W, Section 2

GPS: NAD 83, UTM 12S 298668 E, 4144077 N

DISCUSSION

Black Ridge - Trend Study No. 30-13

Study Information

This study is located on a chained and seeded pinyon-juniper site [elevation: 5,200 feet (1,585 m), slope: 8%-10%, aspect: northwest]. This area has been critical winter range for deer in the past, but currently receives little use because of low deer populations in the area. Cattle were observed in the area during the 1992 reading. Pellet group data taken on the site estimated light use by deer in 1998 and 2003 (21 deer days use/acre: 52 ddu/ha, and 19 ddu/acre: 47 ddu/ha, respectively), and moderate use in 2008 (31 ddu/acre: 76 ddu/ha). No sign of cattle use was encountered within the vicinity of the transect in 1998, 2003, or 2008.

Soils

Soils are igneous in origin, dark-colored, shallow in places, and very rocky. The soil is actually quite deep once you get past the rocky surface. Effective rooting depth is estimated at 24 inches. Soil texture is a clay loam which is moderately acidic (pH 6.0). Phosphorus is 4.2 ppm, which is considered to have low availability for plant growth (Tiedemann and Lopez 2004). There has been erosion occurring on the site in the past as evidenced by the presence of gullies and fairly extensive areas of rock and erosion pavement. However, erosion appears to be controlled since the chaining treatment. Relative combined vegetation and litter cover has ranged from 52%-57% from 1998 to 2008. Relative combined rock and pavement cover has ranged from 34%-40% from 1998 to 2008. The soil erosion condition was classified as stable in 2008.

Browse

This chaining is becoming increasingly dominated by shrubs and trees. During the 1982 reading, browse was not abundant on the site. Mountain big sagebrush (*Artemisia tridentata vaseyana*) (599 plants/acre) and Utah serviceberry (*Amelanchier utahensis*) (333 plants/acre) were the most common. Sagebrush on the site appears to be a hybrid between black sagebrush (*Artemisia nova*) and mountain big sagebrush. However, all sagebrush has been classified as mountain big sagebrush. Mountain big sagebrush increased 94% by 1992 to 10,199 plants/acre. Seedlings were abundant and young plants accounted for 61% of the population. The larger sample size used in 1998 estimated 6,080 plants/acre. The change in density came mostly from the young age class which declined to 32% of the population in 1998. Density of mature plants remained comparable, and seedlings were still abundant. Sagebrush density increased 15% in 2003 to 7,120 plants/acre, but decreased again to 6,240 plants/acre in 2008. Recruitment continued to decline with 11% of the population being comprised of young plants in 2003 and 6% in 2008. The population is mostly lightly browsed and in good vigor.

Serviceberry is scattered throughout the site at a density of around 100 plants/acre. Mature shrubs average nearly 4 feet in height, and utilization is mostly light. Another preferred species, antelope bitterbrush (*Purshia tridentata*), also occurs in limited numbers. It shows moderate to heavy use. Small populations of Gambel oak (*Quercus gambelii*) and shrub-live oak (*Q. turbinella*) also occur on the site. The increaser, broom snakeweed (*Gutierrezia sarothrae*), appeared in the density plots for the first time in 1992. Density was estimated at 2,066 plants/acre with an equal number of seedlings. By 1998, the number of broom snakeweed increased to 3,240 plants/acre. The population declined by 68% to 1,040 plants/acre in 2003, and another 56% to 460 plants/acre in 2008.

Juniper (*Juniperus osteosperma*) and pinyon pine (*Pinus edulis*) trees are abundant and regaining dominance on this site. Point-quarter data estimated 104 juniper trees/acre with an average basal diameter of 6.6 inches in 2003, and 157 juniper trees/acre with a basal diameter of 5.8 inches in 2008. Total line-intercept canopy cover was estimated at 12% in 2003, and 14% in 2008. A photo point comparison between readings suggests that juniper has increased significantly in size since the first reading.

Herbaceous Understory

Seeded and native grasses are well established on the site even though they have steadily declined in abundance since 1992. Crested wheatgrass (*Agropyron cristatum*) dominated with lesser amounts of mutton bluegrass (*Poa fendleriana*) and prairie junegrass (*Koeleria cristata*) from 1992 to 2003. In 2008, Sandberg bluegrass (*Poa secunda*) and bottlebrush squirreltail (*Sitanion hystrix*) were as dominant as crested wheatgrass and mutton bluegrass. Forbs are diverse, although not particularly numerous. Yellow sweetclover (*Melilotus officinalis*) was the only seeded forb encountered during any reading. It has persisted on the site and is one of the most abundant forbs. Other common native perennials include sego lily (*Calochortus nuttallii*), thistle (*Cirsium sp.*), low fleabane (*Erigeron pumilus*), and sulfur eriogonum (*Eriogonum umbellatum*).

1992 TREND ASSESSMENT

The browse trend has improved with increased densities of mountain big sagebrush. However, the density of broom snakeweed also increased and has an age class structure indicating an expanding population. The trend for browse is up. Data in 1982 for the herbaceous understory is limited to species quadrat frequencies. The herbaceous trend is difficult to determine by looking solely at the data. Quadrat frequency of both grasses and forbs have increased. However, by looking at the photos it is apparent that grasses have declined in stature and vigor. Trend for grasses is therefore, slightly down and for forbs is stable.

browse - up (+2)

grass - slightly down (-1)

forb - stable (0)

1998 TREND ASSESSMENT

Trend for the key browse species, mountain big sagebrush appears stable. Differences in density of browse species may be related to the larger sample area used in 1998; therefore, trend for browse was determined using other parameters. Sagebrush vigor is good and decadence has increased, but it is still low at 11%. Juniper trees have greatly increased in size and overhead canopy cover averages 5%. Trend for the grasses is stable. Sum of nested frequency for perennial grasses has remained similar to 1992. Nested frequency of crested wheatgrass declined significantly. The trend for forbs is up. There was a three-fold increase in the sum of nested frequency of perennial forbs.

winter range condition (DCI) - good (78) Mid-level potential scale

browse - stable (0)

grass - stable (0)

forb - up (+2)

2003 TREND ASSESSMENT

Trend for the browse is considered slightly up. The primary browse species, mountain big sagebrush, density has increased 15% since 1998 to 7,120 plants/acre. Sagebrush vigor is normal and decadence low at 18%. It appears that the rapid expansion of sagebrush has slowed on this site. No seedlings were encountered in 2003, and recruitment of young plants has decreased to 11% of the population, but are still fairly numerous. Drought conditions for the past several years in this area may have helped slow expansion of sagebrush. There was also a 68% decline of broom snakeweed to 1,040 plants/acre. One negative aspect of the browse trend is the increase in density and size of juniper trees. Average line intercept canopy cover of juniper has more than doubled since 1998 (5% to 12%). The trend for both grasses and forbs is down. The sum of nested frequency of perennial grasses has declined by 49% since 1998, and the primary seeded grass, crested wheatgrass, has declined significantly with each reading. All other grasses sampled in 2003 also have declining nested frequency values. Average cover of grasses has fallen decreased from 12% in 1998 to 4%. The sum of nested frequency of perennial forbs has declined by 62%, while forb cover has declined from 17% in 1998 to 7%.

winter range condition (DCI) - poor (48) Mid-level potential scale

browse - slightly up (+1)

grass - down (-2)

forb - down (-2)

2008 TREND ASSESSMENT

Trend for browse is slightly down. Density of the primary browse species, mountain big sagebrush, has

decreased by 12% from 2003 to 6,240 plants/acre. Sagebrush vigor has remained good and decadence low at 21%. Recruitment has declined to 6% of the population being comprised of young plants. The density of stickyleaf low rabbitbrush decreased by 56% from 2003 to 460 plants/acre. The density of juniper increased to 157 trees/acre, but the basal diameter decreased slightly. The line intercept canopy cover of juniper increased to 14%. The trend for grasses is stable with a change in species composition. The sum of nested frequency of perennial grass remained similar to 2003. The nested frequency of crested wheatgrass decreased significantly, while the nested frequency of Sandberg bluegrass and bottlebrush squirreltail increased significantly. Sandberg bluegrass and bottlebrush squirreltail became co-dominant species with crested wheatgrass and mutton bluegrass. Cover of perennial grasses decreased to 2% with mutton bluegrass having the highest cover. The annual invasive grass cheatgrass (*Bromus tectorum*) decreased significantly in frequency and decreased in cover. The trend for forbs is up. The sum of nested frequency for perennial forbs increased by 43% from 2003, with a significant increase in the nested frequency of sego lily and sulphur eriogonum.

winter range condition (DCI) - poor (40) Mid-level potential scale
 browse - slightly down (-1) grass - stable (0) forb - up (+2)

HERBACEOUS TRENDS --
 Management unit 30 , Study no: 13

T y p e	Species					Average Cover %		
		'92	'98	'03	'08	'98	'03	'08
G	Agropyron cristatum	_d 249	_c 192	_b 106	_a 47	5.53	1.84	.40
G	Agropyron intermedium	_{ab} 3	_{ab} 3	_a -	_b 11	.03	-	.02
G	Bromus tectorum (a)	-	_c 113	_b 53	_a 17	1.32	.20	.04
G	Elymus junceus	_b 10	_{ab} 3	_a -	_a -	.03	-	-
G	Koeleria cristata	_b 26	_c 63	_b 31	_a -	2.53	.43	-
G	Poa fendleriana	47	58	30	40	2.14	1.50	.51
G	Poa secunda	_a -	_a 4	_a -	_b 48	.06	-	.36
G	Sitanion hystrix	_{bc} 32	_{ab} 17	_a 7	_c 49	.33	.33	.35
G	Vulpia octoflora (a)	-	_b 11	_{ab} 11	_a -	.05	.07	.00
Total for Annual Grasses		0	124	64	17	1.37	0.27	0.04
Total for Perennial Grasses		367	340	174	195	10.67	4.11	1.65
Total for Grasses		367	464	238	212	12.05	4.38	1.69
F	Agoseris glauca	_a -	_b 18	_a -	_{ab} 10	.12	-	.02
F	Antennaria rosea	3	-	-	-	-	-	-
F	Arabis sp.	2	4	-	1	.01	-	.00
F	Artemesia biennis	1	-	-	-	-	-	-
F	Aster sp.	2	5	3	9	.04	.03	.07
F	Astragalus sp.	-	7	2	3	.09	.00	.03
F	Balsamorhiza hookeri	2	-	-	-	-	.03	.03
F	Calochortus nuttallii	_a -	_{bc} 20	_{ab} 5	_c 31	.05	.01	.07
F	Cirsium calcareum	_a 4	_b 17	_{ab} 13	_{ab} 11	.49	.63	.07
F	Comandra pallida	-	-	2	-	-	.00	-

T y p e	Species					Average Cover %		
		'92	'98	'03	'08	'98	'03	'08
F	<i>Collinsia parviflora</i> (a)	_b 43	_a 17	_a 7	_a 20	.05	.01	.05
F	<i>Cordylanthus</i> sp. (a)	-	_c 80	_b 44	_a 15	.56	.72	.11
F	<i>Crepis acuminata</i>	-	-	2	4	-	.15	.01
F	<i>Crepis occidentalis</i>	1	-	-	-	-	-	-
F	<i>Descurainia pinnata</i> (a)	-	-	3	-	-	.03	-
F	<i>Draba</i> sp. (a)	-	_b 30	_{ab} 12	_a 7	.15	.03	.02
F	<i>Epilobium brachycarpum</i> (a)	-	_c 29	_a -	_b 9	.06	-	.02
F	<i>Erigeron pumilus</i>	_a 2	_b 34	_a 4	_a -	.24	.03	-
F	<i>Eriogonum racemosum</i>	_a -	_a -	_b 13	_{ab} 6	-	.07	.04
F	<i>Eriogonum umbellatum</i>	_a 15	_b 40	_a 17	_b 43	.65	.13	.59
F	<i>Lithospermum</i> sp.	-	4	4	-	.03	.06	-
F	<i>Lithophragma</i> sp.	-	-	-	5	-	-	.01
F	<i>Lomatium</i> sp.	-	7	9	5	.02	.02	.01
F	<i>Lotus utahensis</i>	-	-	-	6	-	-	.04
F	<i>Lupinus argenteus</i>	_a -	_b 12	_a -	_a -	.19	-	-
F	<i>Melilotus officinalis</i>	_b 28	_c 60	_{ab} 23	_a 3	1.88	.33	.01
F	<i>Microsteris gracilis</i> (a)	_a -	_b 13	_d 73	_c 43	.04	.63	.09
F	<i>Phlox longifolia</i>	_a -	_b 6	_b 9	_c 21	.01	.04	.06
F	<i>Polygonum douglasii</i> (a)	-	_b 14	_a -	_c 34	.03	-	.08
F	<i>Ranunculus</i> sp.	-	_b 54	_a -	_a -	.22	-	-
F	<i>Ranunculus testiculatus</i> (a)	-	-	-	1	-	-	.00
F	<i>Sphaeralcea grossulariifolia</i>	-	-	3	-	-	.00	-
F	<i>Tragopogon dubius</i>	1	-	-	-	-	-	-
F	Unknown forb-annual (a)	-	_a -	_a -	_b 39	-	-	.13
F	<i>Viguiera multiflora</i>	_b 35	_a 5	_a -	_a -	.18	-	-
F	<i>Zigadenus paniculatus</i>	-	3	3	2	.01	.03	.00
Total for Annual Forbs		43	183	139	168	0.90	1.43	0.52
Total for Perennial Forbs		96	296	112	160	4.27	1.61	1.09
Total for Forbs		139	479	251	328	5.17	3.04	1.62

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

BROWSE TRENDS --

Management unit 30 , Study no: 13

Type	Species	Strip Frequency			Average Cover %		
		'98	'03	'08	'98	'03	'08
B	Amelanchier utahensis	5	4	3	1.08	1.54	1.19
B	Artemisia tridentata vaseyana	89	89	86	14.92	13.55	15.66
B	Chrysothamnus nauseosus hololeucus	1	0	0	.00	-	-
B	Gutierrezia sarothrae	41	24	17	1.74	.43	.10
B	Juniperus osteosperma	14	17	13	3.59	8.79	6.79
B	Opuntia sp.	2	2	1	.00	.00	.00
B	Purshia tridentata	1	2	2	.15	.00	.00
B	Quercus gambelii	3	4	4	1.41	.45	.33
B	Quercus turbinella	1	2	2	.38	.53	.03
Total for Browse		157	144	128	23.30	25.29	24.11

CANOPY COVER, LINE INTERCEPT --

Management unit 30 , Study no: 13

Species	Percent Cover		
	'98	'03	'08
Amelanchier utahensis	-	1.41	2.75
Artemisia tridentata vaseyana	-	16.33	18.18
Gutierrezia sarothrae	-	.35	.05
Juniperus osteosperma	5.00	11.80	14.01
Opuntia sp.	-	.03	-
Pinus edulis	-	-	.71
Pinus monophylla	.60	.63	-
Purshia tridentata	-	.38	.50
Quercus gambelii	-	1.68	1.08
Quercus turbinella	-	-	.76

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 30 , Study no: 13

Species	Average leader growth (in)	
	'03	'08
Amelanchier utahensis	1.4	1.0
Artemisia tridentata vaseyana	3.1	0.9

POINT-QUARTER TREE DATA --
Management unit 30 , Study no: 13

Species	Trees per Acre		
	'98	'03	'08
Juniperus osteosperma	90	104	157
Pinus monophylla	6	<18	25

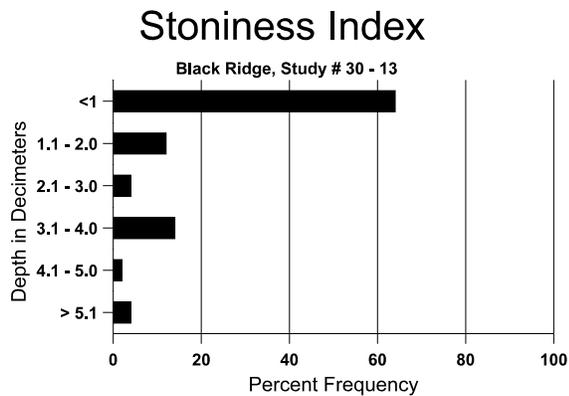
Average diameter (in)		
'98	'03	'08
3.8	6.6	5.8
4.0	-	3.4

BASIC COVER --
Management unit 30 , Study no: 13

Cover Type	Average Cover %				
	'82	'92	'98	'03	'08
Vegetation	12.00	6.75	36.18	30.42	25.81
Rock	17.25	34.50	40.43	35.95	36.70
Pavement	5.25	6.00	11.23	5.14	9.95
Litter	57.00	44.00	39.61	38.73	35.27
Cryptogams	1.50	.75	.32	.19	.13
Bare Ground	7.00	8.75	6.98	10.60	9.80

SOIL ANALYSIS DATA --
Management unit 30, Study no: 13, Study Name: Black Ridge

Effective rooting depth (in)	Temp °F (depth)	pH	clay loam			%OM	PPM P	PPM K	ds/m
			% sand	% silt	% clay				
24.2	44.8 (17.7)	6.0	32.0	33.4	34.6	2.1	4.2	76.8	0.5



PELLET GROUP DATA --

Management unit 30 , Study no: 13

Type	Quadrat Frequency		
	'98	'03	'08
Rabbit	12	12	72
Deer	17	4	27

Days use per acre (ha)		
'98	'03	'08
-	-	-
21 (52)	19 (46)	31 (76)

BROWSE CHARACTERISTICS --

Management unit 30 , Study no: 13

		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>Amelanchier utahensis</i>												
82	333	-	-	333	-	-	20	0	0	-	0	11/18
92	133	-	133	-	-	-	0	0	0	-	0	-/-
98	1140	-	380	760	-	-	2	0	0	-	0	41/45
03	120	-	40	60	20	-	17	0	17	-	0	47/53
08	60	140	-	60	-	-	0	0	0	-	0	48/55
<i>Artemisia tridentata vaseyana</i>												
82	599	-	133	466	-	-	0	0	0	-	0	14/25
92	10198	5466	6266	3799	133	-	7	0	1	-	.65	14/18
98	6080	2360	1940	3480	660	200	12	0	11	4	7	19/31
03	7120	-	780	5060	1280	380	14	0	18	6	6	20/25
08	6240	500	360	4560	1320	360	34	3	21	9	9	20/31
<i>Chrysothamnus nauseosus hololeucus</i>												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
92	0	-	-	-	-	-	0	0	0	-	0	-/-
98	40	-	-	-	40	-	0	0	100	100	100	-/-
03	0	-	-	-	-	-	0	0	0	-	0	-/-
08	0	-	-	-	-	-	0	0	0	-	0	-/-
<i>Gutierrezia sarothrae</i>												
82	0	-	-	-	-	-	0	0	0	-	0	-/-
92	2065	2733	399	1666	-	-	0	0	0	-	0	9/9
98	3240	-	500	2660	80	20	0	0	2	.61	.61	6/8
03	1040	-	20	900	120	20	0	0	12	6	6	8/8
08	460	60	120	320	20	120	0	0	4	4	4	6/5

		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)
Juniperus osteosperma												
82	799	-	133	666	-	-	0	0	0	-	0	47/27
92	332	66	133	199	-	-	0	0	0	-	0	30/62
98	320	-	120	200	-	20	0	0	0	-	0	-/-
03	420	-	80	300	40	-	0	0	10	-	0	-/-
08	280	60	100	180	-	-	0	0	0	-	0	-/-
Opuntia sp.												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
92	132	-	66	66	-	-	0	0	-	-	0	11/17
98	40	-	-	40	-	-	0	0	-	-	0	4/3
03	60	-	-	60	-	-	0	0	-	-	0	6/9
08	20	-	-	20	-	-	0	0	-	-	0	6/12
Pinus monophylla												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
92	0	-	-	-	-	-	0	0	-	-	0	-/-
98	0	-	-	-	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	-/-
08	0	20	-	-	-	-	0	0	-	-	0	-/-
Purshia tridentata												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
92	0	-	-	-	-	-	0	0	-	-	0	-/-
98	20	-	-	20	-	-	100	0	-	-	0	12/100
03	60	-	-	60	-	-	0	67	-	-	0	16/34
08	40	-	-	40	-	-	0	50	-	-	0	21/48
Quercus gambelii												
82	133	-	133	-	-	-	0	0	-	-	0	-/-
92	0	-	-	-	-	-	0	0	-	-	0	-/-
98	140	-	-	140	-	40	0	0	-	-	0	60/41
03	220	-	120	100	-	40	0	0	-	-	0	39/24
08	380	-	220	160	-	40	0	0	-	-	0	43/35
Quercus turbinella												
82	0	-	-	-	-	-	0	0	-	-	0	-/-
92	0	-	-	-	-	-	0	0	-	-	0	-/-
98	200	-	-	200	-	-	0	0	-	-	0	61/28
03	160	-	-	160	-	-	0	0	-	-	0	62/11
08	180	20	-	180	-	-	0	0	-	-	0	67/26