

Trend Study 24-9-08

Study site name: Mud Spring .

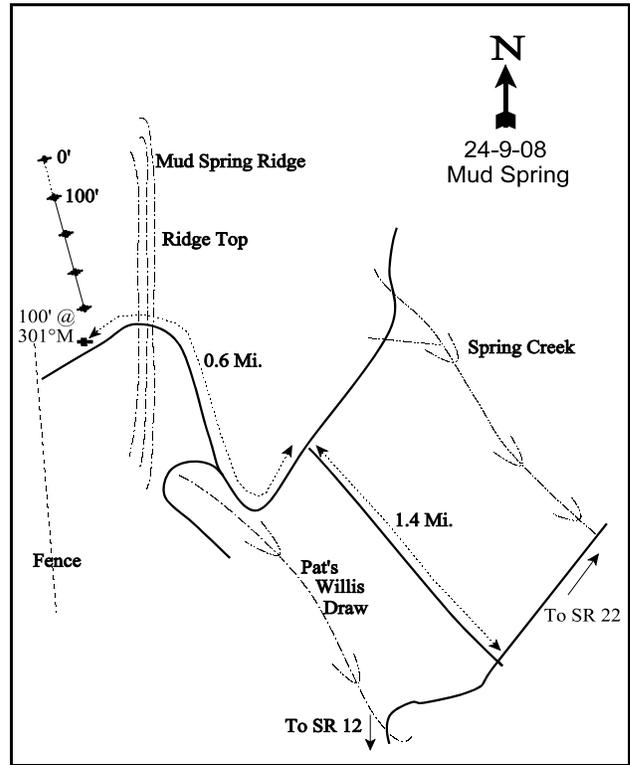
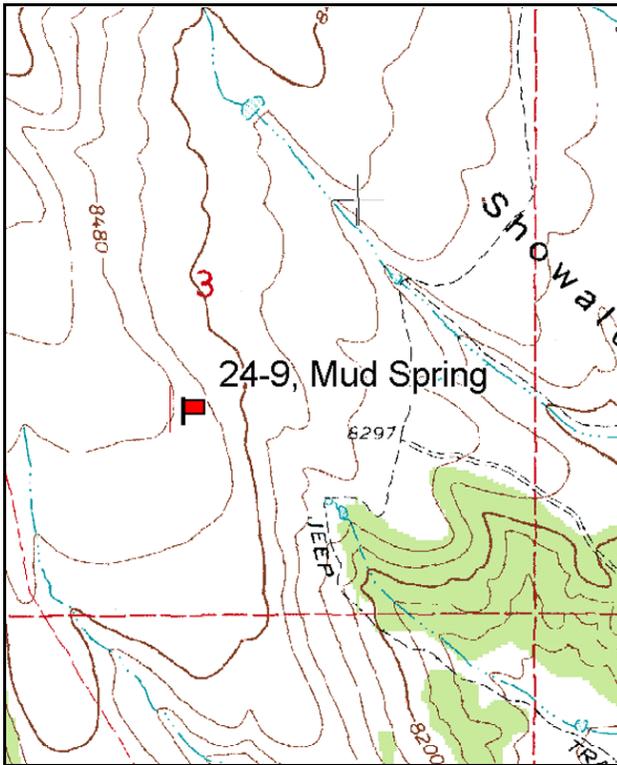
Vegetation type: Black Sagebrush .

Compass bearing: frequency baseline 167 degrees magnetic.

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

LOCATION DESCRIPTION

From SR 22, about 1^{1/2} miles south of Widstoe Junction, turn west onto the road leading to Tom Best Spring and Highway 12. Proceed 4.2 miles to the U.S. Forest Service boundary. Continue on the main road for 5.3 miles to an intersection at Showalter Creek. Continue on the main road 1 mile to a faint road on the right. Turn and go up towards Mud Spring Ridge 1.4 miles to a T-intersection. Turn left and go 0.6 miles up a faint, rough road to the top of the ridge and a witness post identifying the study area. The 400 foot stake is 100 feet northwest of the witness post. The start of the transect is actually 400 feet north, and runs back south towards the road. Study markers are 1-foot tall fence posts.



Map Name: Flake Mountain West

Diagrammatic Sketch

Township 35S ,Range 4W , Section 3

GPS: NAD 83, UTM 12S 393112 E, 4182844 N

DISCUSSION

Mud Spring - Trend Study 24-9

Study Information

This study is located on key elk wintering area on a sagebrush covered bench east of Spring Creek and southeast of Pat Willis Draw [elevation: 8,480 feet (2,585 m), slope: 3%-5%, aspect: southeast]. The southern aspect, coupled with sufficient wind, limits snow depth on this area during much of the winter. Black sagebrush (*Artemisia nova*) is the dominant shrub on this site and a variety of grasses and forbs occupy the understory. Several deer were seen near the site in 1997 and there was evidence that moderately high numbers of deer and elk have been using the site. Quadrat frequency of deer pellet groups was 22% in 1997 while elk numbered 34%. Deer and elk use was moderate in 2003 (32 ddu/acre:79 ddu/ha and 32 edu/acre:79 edu/ha), and light in 2008 (7 ddu/acre: 17 ddu/ha and 8 edu/acre:20 edu/ha). Cattle also use the area and were seen in the vicinity by a stock pond in 1997. Cattle had used the site during the spring of 2003 (16 cdu/acre:39 cdu/ha), and there was minimal use estimated in 2008. Minimal horse use was also detected in 2008. Sage grouse pellets had a quadrat frequency of 2% in 2003 and 7% in 2008. Rabbit use was noted to be very high in 2008.

Soil

Effective rooting depth is estimated at almost 12 inches. Soil texture at the site is a sandy clay loam which is slightly acidic (pH 6.1). Rocks are common on the surface and throughout the profile. They are generally less than three inches in diameter. Erosion pavement is present on the soil surface, indicating some sheet erosion has taken place over time. Many plants are pedestaled, but overall, the erosion potential on this site is currently low, given the rocky soil and gentle slope. Ground cover appears adequate to limit surface runoff and to promote infiltration. The relative combined vegetation and litter cover has been steady at 62%-64% since 1997. The relative combined rock and pavement cover has remained steady at 14%-15% since 1997. The erosion condition was classified as stable in 2003 and 2008.

Browse

The key shrub species is black sagebrush. There is also some isolated patches of mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) on the site. Black sagebrush accounted for 63% of the browse cover in 1997, 72% in 2003, and 70% in 2008 with average cover values of 12%, 21%, and 13% respectively. The population is dense and dynamic. Density has fluctuated from a high of 22,733 plants/acre in 1991, to nearly 10,000 plants/acre in 1997, and increasing again to a density of 18,820 plants/acre in 2003. Vigor has remained good on most plants during all years and decadence has remained low. Young recruitment has been excellent during each reading.

The site also supports several other shrubs which offer additional browse forage including mountain big sagebrush, dwarf rabbitbrush (*Chrysothamnus depressus*), rubber rabbitbrush (*Chrysothamnus nauseosus* ssp. *hololeucus*), Parry rabbitbrush (*Chrysothamnus parryi*), and small numbers of bitterbrush (*Purshia tridentata*). All of these species have increased in density between 1997 and 2003. Parry rabbitbrush and bitterbrush increased in density from 2003 to 2008. The small populations of mountain big sagebrush and bitterbrush were moderately hedged in 2003. The increaser, stickyleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*), also occurs on the site in moderate numbers.

Herbaceous Understory

The herbaceous understory is diverse and fairly abundant for a black sagebrush site. Seven perennial grasses and one sedge (*Carex* sp.) combined to produce over 13% cover in 1997 and 2003. The most common grasses include mutton bluegrass (*Poa fendleriana*), Letterman needlegrass (*Stipa lettermani*), needle-and-thread grass (*Stipa comata*), and a sedge. The forb composition is also diverse and productive. Twenty-seven forbs were identified in 1997, 22 in 2003, and 26 in 2008. Common species include rose pussytoes (*Antennaria rosea*),

Eaton fleabane (*Erigeron eatonii*), redroot eriogonum (*Eriogonum racemosum*), sulfur eriogonum (*Eriogonum umbellatum*), silky lupine (*Lupinus sericeus*), and lobeleaf groundsel (*Senecio multilobatus*).

1991 TREND ASSESSMENT

Trend for the browse component of the community would be up, because the key species, black sagebrush, has almost doubled in density with only a slight increase in percent decadency. The trend for the grasses is stable. The quadrat frequency and sum of nested frequency did not change significantly. The trend for forbs is slightly down because of a significant decrease in the sum of nested frequency of a few species. There is a high diversity of both forbs and grasses on the site.

browse - up (+2)

grass - stable (0)

forb - slightly down (-1)

1997 TREND ASSESSMENT

Trend for the key browse species, black sagebrush, is stable. Density differences of browse species may be related to the larger sample area used in 1997, therefore, trend for browse was determined using other parameters. Black sagebrush decadence remained similar to 1991, and plants displaying poor vigor increased slightly to 11%. Recruitment of young black sagebrush plants declined from 34% of the population in 1991 to 15%. Trend for the grasses and forbs is stable. Sum of nested frequency for both grasses and forbs has remained similar since 1991.

winter range condition (DCI) - excellent (76) Mid-level potential scale

browse - stable (0)

grass - stable (0)

forb - stable (0)

2003 TREND ASSESSMENT

Trend for browse is up. The key species, black sagebrush, has doubled in density from 9,920 plants/acre in 1997 to 18,820 plants/acre. Black sagebrush vigor was good and decadence was low. Young recruitment is good, however, density is higher than what would be preferred and cover has nearly doubled from 12% in 1997 to 21% in 2003. Other preferred shrubs occur in smaller numbers but have also increased in density. Trend for the herbaceous understory is mixed. Trend for grass is stable. Sum of nested frequency of perennial grasses has declined slightly with each reading since 1991, but has only declined 4% since 1997. Nested frequency of sedge declined significantly while frequency of mutton bluegrass increased significantly. Some of the increase in mutton bluegrass is likely due to identification problems with Sandberg bluegrass (*Poa secunda*). Cover of perennial grasses has also remained stable since 1997 at about 13.5%. The trend for forbs is slightly down. Sum of nested frequency of perennial forbs has declined more significantly with each reading since 1987, and sum of nested frequency fell 20% since 1997. Cover of forbs has declined slightly from 7% in 1997 to 5% in 2003.

winter range condition (DCI) - excellent (84) Mid-level potential scale

browse - up (+2)

grass - stable (0)

forb - slightly down (-1)

2008 TREND ASSESSMENT

Trend for browse is slightly down. The key browse species, black sagebrush, decreased in density by 27% since 2003 to 13,780 plants/acre. This is a more sustainable population than some historic densities, but decadence increased to 30% and plants displaying poor vigor increased to 19%. Recruitment is still good with young plants comprising 11% of the population. The trend for grass remains stable. The average cover of perennial grasses increased slightly to 17%, but the sum of nested frequency of perennial grasses remained similar to 2003. The trend for forbs is slightly up. The average cover of perennial forbs increased to over 10% and the sum of nested frequency increased by 35%.

winter range condition (DCI) - excellent (70) Mid-level potential scale

browse - slightly down (-1)

grass - stable (0)

forb - slightly down (-1)

HERBACEOUS TRENDS --
Management unit 24 , Study no: 9

T y p e	Species	Nested Frequency					Average Cover %		
		'87	'91	'97	'03	'08	'97	'03	'08
G	Agropyron smithii	a3	a7	a6	a7	b35	.18	.04	.40
G	Agropyron trachycaulum	-	-	7	-	-	.16	-	-
G	Bouteloua gracilis	29	23	20	22	26	.15	.27	.75
G	Carex sp.	a62	b102	ab79	a58	ab67	2.15	1.22	1.06
G	Poa fendleriana	a-	a-	b158	d248	c200	3.26	7.83	8.60
G	Poa secunda	c211	c218	b44	a-	b22	1.27	-	.17
G	Sitanion hystrix	b102	a65	a33	a34	a37	.21	.19	.61
G	Stipa columbiana	-	-	-	5	6	-	.03	.09
G	Stipa comata	ab51	a34	ab43	a28	b71	.86	.32	3.08
G	Stipa lettermani	ab146	bc179	c219	bc181	a111	5.17	3.73	2.20
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		604	628	609	583	575	13.44	13.65	16.98
Total for Grasses		604	628	609	583	575	13.44	13.65	16.98
F	Achillea millefolium	-	-	-	-	9	-	-	.16
F	Antennaria rosea	a14	ab16	abc42	ab45	c40	1.27	.74	.78
F	Androsace septentrionalis (a)	-	-	-	-	5	-	-	.01
F	Arabis sp.	b20	a3	a1	a-	ab11	.00	-	.03
F	Astragalus humistratus	c151	b14	a-	a-	a-	-	-	-
F	Astragalus newberryi	-	4	-	-	-	-	-	-
F	Aster sp.	-	-	3	1	-	.00	.00	-
F	Astragalus sp.	a-	b29	c96	a3	c54	.73	.03	.48
F	Balsamorhiza ssp.	-	3	-	-	-	-	-	-
F	Castilleja linariaefolia	b42	a1	a3	a8	a1	.02	.01	.03
F	Chaenactis douglasii	4	-	4	-	-	.00	-	-
F	Cirsium sp.	b46	ab35	a23	a18	ab28	.37	.35	1.32
F	Crepis acuminata	a-	ab7	a-	b9	b14	-	.07	.03
F	Cryptantha sp.	-	3	1	-	7	.03	-	.02
F	Erigeron eatonii	c246	b215	a31	a29	a30	.20	.19	.20
F	Erigeron flagellaris	-	-	-	1	-	-	.00	-
F	Erigeron pumilus	a-	a-	ab16	b29	a-	.06	.30	-
F	Eriogonum racemosum	b223	b214	ab185	a172	ab204	1.45	1.68	3.07
F	Eriogonum umbellatum	75	80	57	47	47	.56	.70	.53
F	Galium boreale	-	-	5	-	-	.01	-	-
F	Gayophytum ramosissimum(a)	-	-	-	7	6	-	.01	.02

Type	Species	Nested Frequency					Average Cover %		
		'87	'91	'97	'03	'08	'97	'03	'08
F	Haplopappus acaulis	-	-	-	-	3	-	-	.00
F	Hymenoxys acaulis	-	-	6	-	4	.04	-	.01
F	Hymenopappus filifolius	-	4	-	2	-	-	.03	-
F	Linum lewisii	-	-	1	-	-	.03	-	-
F	Lotus utahensis	_b 24	_{ab} 14	_a 1	_{ab} 22	_c 78	.00	.12	1.76
F	Lupinus sp. (a)	-	-	_a -	_a -	_b 15	-	-	.06
F	Lupinus pusillus (a)	3	-	-	-	-	-	-	-
F	Lupinus sericeus	_c 65	_{ab} 38	_{bc} 51	_{ab} 27	_a 17	1.33	.29	.93
F	Lygodesmia spinosa	10	14	16	5	7	.10	.19	.04
F	Microsteris gracilis (a)	-	-	2	-	-	.00	-	-
F	Orthocarpus sp. (a)	-	-	_a 2	_b 19	_{ab} 10	.01	.10	.06
F	Penstemon comarrhenus	_b 16	_b 4	_b 5	_a -	_{ab} 8	.01	-	.19
F	Phlox longifolia	_a -	_a -	_b 19	_{ab} 10	_c 51	.04	.02	.13
F	Potentilla diversifolia	7	2	10	9	4	.22	.07	.33
F	Polygonum douglasii (a)	-	-	_b 23	_a -	_a 2	.05	-	.01
F	Senecio integerrimus	-	-	-	3	-	-	.00	-
F	Senecio multilobatus	_d 71	_a 4	_{ab} 21	_{cd} 47	_{bc} 40	.18	.35	.22
F	Sphaeralcea coccinea	_a -	_a -	_b 11	_a 4	_{ab} 6	.04	.04	.03
F	Taraxacum officinale	-	2	3	-	-	.00	-	-
Total for Annual Forbs		3	0	27	26	38	0.06	0.11	0.16
Total for Perennial Forbs		1014	706	611	491	663	6.76	5.25	10.36
Total for Forbs		1017	706	638	517	701	6.82	5.37	10.52

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

BROWSE TRENDS --

Management unit 24 , Study no: 9

Type	Species	Strip Frequency			Average Cover %		
		'97	'03	'08	'97	'03	'08
B	<i>Artemisia nova</i>	78	100	92	12.12	21.05	13.00
B	<i>Artemisia tridentata vaseyana</i>	13	17	8	1.64	1.72	.44
B	<i>Chrysothamnus depressus</i>	45	35	13	3.40	2.66	0.0
B	<i>Chrysothamnus nauseosus hololeucus</i>	6	19	0	.01	.95	-
B	<i>Chrysothamnus parryi</i>	2	38	24	.03	.40	.62
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	28	45	88	1.90	1.97	3.49
B	<i>Gutierrezia sarothrae</i>	1	0	0	0.0	-	-
B	<i>Leptodactylon pungens</i>	12	22	25	.02	.43	.60
B	<i>Purshia tridentata</i>	0	4	3	-	.03	.38
B	<i>Symphoricarpos oreophilus</i>	1	1	0	.00	0.0	.03
B	<i>Tetradymia canescens</i>	1	3	1	0.0	.15	0.0
Total for Browse		187	284	141	19.15	29.37	18.57

CANOPY COVER, LINE INTERCEPT --

Management unit 24 , Study no: 9

Species	Percent Cover	
	'03	'08
<i>Artemisia nova</i>	18.03	14.14
<i>Artemisia tridentata vaseyana</i>	1.45	.88
<i>Chrysothamnus depressus</i>	1.10	-
<i>Chrysothamnus nauseosus hololeucus</i>	1.04	-
<i>Chrysothamnus parryi</i>	.05	.31
<i>Chrysothamnus viscidiflorus viscidiflorus</i>	.96	3.86
<i>Leptodactylon pungens</i>	.11	.16
<i>Purshia tridentata</i>	.10	.20
<i>Symphoricarpos oreophilus</i>	.26	-
<i>Tetradymia canescens</i>	-	.03

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 24 , Study no: 9

Species	Average leader growth (in)	
	'03	'08
Artemisia nova	1.1	0.6
Artemisia tridentata vaseyana	1.6	1.3
Purshia tridentata	2.5	-

BASIC COVER --

Management unit 24 , Study no: 9

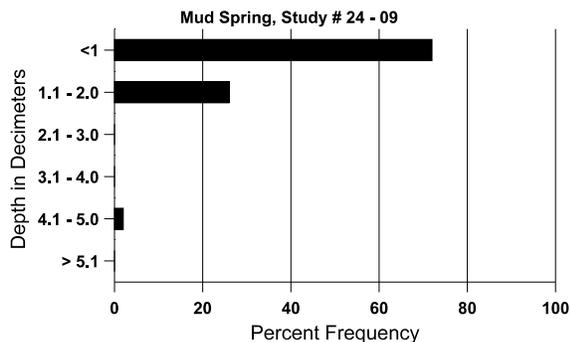
Cover Type	Average Cover %				
	'87	'91	'97	'03	'08
Vegetation	10.75	10.50	29.07	46.79	43.67
Rock	8.00	9.25	8.10	10.64	10.44
Pavement	8.25	4.75	6.79	5.69	5.26
Litter	53.75	46.25	30.77	28.35	27.96
Cryptogams	0	.25	.13	.13	0
Bare Ground	19.25	29.00	22.82	25.11	24.62

SOIL ANALYSIS DATA --

Management unit 24, Study no: 9, Study Name: Mud Spring

Effective rooting depth (in)	Temp °F (depth)	pH	sandy clay loam			%OM	PPM P	PPM K	dS/m
			%sand	%silt	%clay				
11.6	62.3 (10.4)	6.1	48.7	25.4	25.8	2.7	11.9	275.2	0.5

Stoniness Index



PELLET GROUP DATA --

Management unit 24 , Study no: 9

Type	Quadrat Frequency		
	'97	'03	'08
Rabbit	8	20	92
Grouse	-	2	7
Elk	34	14	2
Deer	22	10	7
Cattle	8	5	3

Days use per acre (ha)	
'03	'08
-	-
-	4 (35)
32 (79)	8 (20)
32 (79)	7 (17)
16 (39)	1 (2)

BROWSE CHARACTERISTICS --

Management unit 24 , Study no: 9

		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 nova</i>												
87	12065	2399	3666	7266	1133	-	18	.55	9	.33	11	11/13
91	22731	17399	7799	10533	4399	-	16	.58	19	.79	3	13/14
97	9920	480	1440	6840	1640	680	4	0	17	10	11	12/19
03	18820	80	2280	14040	2500	520	3	0	13	4	4	13/18
08	13780	4420	1520	8120	4140	1820	40	.72	30	3	19	11/15
<i>Artemisia tridentata vaseyana</i>												
87	0	-	-	-	-	-	0	0	0	-	0	-/-
91	66	-	-	66	-	-	0	0	0	-	0	10/11
97	340	80	-	220	120	60	18	0	35	6	6	24/34
03	460	-	20	360	80	60	61	0	17	4	4	26/36
08	420	80	40	300	80	60	5	14	19	10	19	15/18
<i>Chrysothamnus depressus</i>												
87	0	-	-	-	-	-	0	0	0	-	0	-/-
91	0	-	-	-	-	-	0	0	0	-	0	-/-
97	3040	20	580	2460	-	-	0	0	0	-	0	5/8
03	3980	-	-	3980	-	-	0	0	0	-	0	4/7
08	440	20	80	260	100	-	9	5	23	-	0	4/7
<i>Chrysothamnus nauseosus hololeucus</i>												
87	0	-	-	-	-	-	0	0	0	-	0	-/-
91	998	-	333	266	399	-	20	53	40	-	0	5/6
97	180	-	100	80	-	-	0	0	0	-	0	7/10
03	1280	-	-	1220	60	-	8	0	5	2	2	6/10
08	0	-	-	-	-	-	0	0	0	-	0	-/-

		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)
Chrysothamnus parryi												
87	0	-	-	-	-	-	0	0	0	-	0	-/-
91	0	-	-	-	-	-	0	0	0	-	0	-/-
97	80	-	20	60	-	-	0	0	0	-	0	9/10
03	1480	-	20	1460	-	-	18	26	0	-	0	6/8
08	1360	-	80	1240	40	-	10	3	3	-	1	6/8
Chrysothamnus viscidiflorus viscidiflorus												
87	9331	266	2999	6133	199	-	0	.71	2	.21	6	4/6
91	14665	799	3733	9933	999	-	7	43	7	.54	2	5/8
97	1880	-	-	1860	20	-	2	0	1	1	1	14/23
03	2960	-	80	2780	100	-	0	0	3	1	1	7/10
08	7700	140	700	6880	120	140	13	4	2	-	3	5/9
Gutierrezia sarothrae												
87	66	-	-	66	-	-	0	0	-	-	0	5/3
91	0	-	-	-	-	-	0	0	-	-	0	-/-
97	20	-	-	20	-	-	0	0	-	-	0	6/6
03	0	-	-	-	-	-	0	0	-	-	0	-/-
08	0	-	-	-	-	-	0	0	-	-	0	-/-
Leptodactylon pungens												
87	2265	-	266	1999	-	-	0	0	0	-	0	5/3
91	8265	133	4133	4066	66	-	.80	0	1	-	2	4/5
97	460	20	-	440	20	-	0	0	4	4	4	6/7
03	880	-	-	780	100	-	0	0	11	5	5	6/7
08	1120	180	60	980	80	-	7	0	7	2	2	4/5
Opuntia sp.												
87	66	-	-	66	-	-	0	0	-	-	0	5/4
91	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	2/5
03	0	-	-	-	-	-	0	0	-	-	0	-/-
08	0	-	-	-	-	-	0	0	-	-	0	-/-
Purshia tridentata												
87	0	-	-	-	-	-	0	0	0	-	0	-/-
91	0	-	-	-	-	-	0	0	0	-	0	-/-
97	0	-	-	-	-	-	0	0	0	-	0	-/-
03	100	-	-	80	20	-	0	100	20	20	20	10/22
08	60	20	20	40	-	-	0	0	0	-	0	11/16

		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)	
<i>Symphoricarpos oreophilus</i>													
87	0	-	-	-	-	-	0	0	-	-	0	-/-	
91	0	-	-	-	-	-	0	0	-	-	0	-/-	
97	20	-	-	20	-	-	100	0	-	-	0	12/30	
03	40	-	-	40	-	-	0	0	-	-	0	10/24	
08	0	-	-	-	-	-	0	0	-	-	0	13/36	
<i>Tetradymia canescens</i>													
87	199	-	133	66	-	-	33	0	0	-	0	8/6	
91	199	-	199	-	-	-	0	0	0	-	0	-/-	
97	20	-	20	-	-	-	0	0	0	-	0	-/-	
03	80	-	-	80	-	-	0	0	0	-	0	7/9	
08	20	-	-	-	20	-	0	0	100	-	100	9/6	