

Trend Study 2-27-06

Study site name: Laketown Canyon.

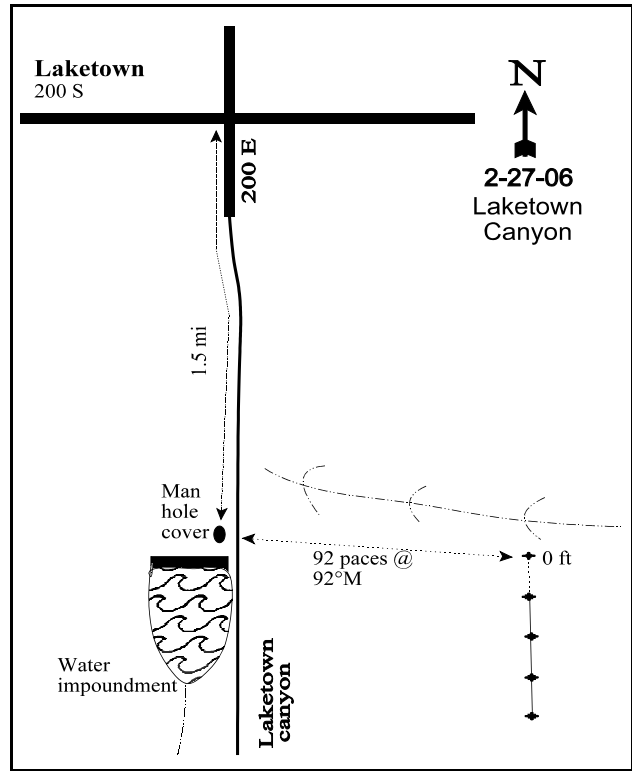
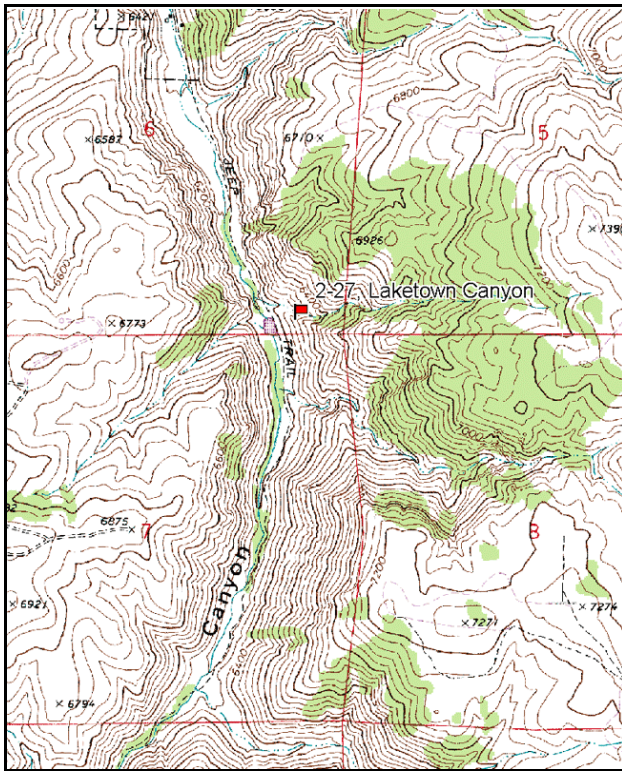
Vegetation type: Mountain Mahogany.

Compass bearing: frequency baseline 162 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). No rebar marking belt placement.

LOCATION DESCRIPTION

From 200 East 200 South in Laketown, proceed south into Laketown Canyon 1.5 miles stopping at a stockpond dam. Walk to the manhole cover on the northeast corner of the dam. Take an azimuth of 92 degrees magnetic and walk 92 paces up the ridge to the 0-foot baseline stake. The 0-foot stake is marked with browse tag #7937.



Map Name: Laketown

Diagrammatic Sketch

Township 12N, Range 6E, Section 7

UTM NAD 27, UTM 12T 4627657 N, 474653 E

DISCUSSION

Laketown Canyon - Trend Study No. 2-27

Study Information

This study is located south of Bear Lake in Laketown Canyon on land administered by the BLM. It samples a mountain mahogany deer winter range (elevation: 6,300 feet, slope: 50-55%, aspect: west). Although elk are known to inhabit this general area, elk pellet groups have not been sampled at the study. In 1984, deer and domestic sheep pellet groups, tracks, and other signs were very common. Deer pellet groups were not very abundant in 1996 with a quadrat frequency of only 9%. A pellet group transect read in 2001 estimated 42 deer days use/acre (103 ddu/ha). A few moose pellet groups were seen near the study, but were not encountered within the pellet group transect. Cattle sign occurs at the bottom of the slope around a nearby stock pond, but not on the steep slopes. Pellet group data from 2006 was estimated at 5 deer, 2 moose, and 5 cow days use/acre (12 ddu/ha, 5 mdu/ha, and 13 cdu/ha).

Soil

Soil is classified within the Lundy series. Soils are excessively drained and moderately permeable to water. Formed residually or colluvially from limestone and shale, these soils normally possess only a 16 inch profile before fractured limestone bedrock is encountered. Strongly calcareous and moderately alkaline (pH of 7.6), the Lundy soil usually dries completely in mid-summer. Erosion is moderate to high (Campbell and Lacey 1982; USDA-NRCS 2006). Soil has a loam texture with an effective rooting depth estimated at just under 12 inches. Some bare ground is exposed mainly along trails that follow the contour. There is some erosion occurring due to the steep slope, but it does not appear to be excessive. Soil movement consists primarily of pedestalled soil on the uphill side of shrubs. The ratio of protective cover (vegetation, litter, and cryptograms) to bare ground was fair at 3.4:1 in 2006. The erosion condition class was determined to be slight in 2001 and 2006.

Browse

Browse composition includes several co-dominant shrubs of which the most important are black sagebrush, true mountain mahogany, and mountain big sagebrush. Black sagebrush is the most abundant preferred species with a density of 1,460 plants/acre in 1996. Density has slowly declined since 1996 to 1,160 plants/acre in 2001 and 880 plants/acre in 2006. Utilization is mostly light and decadence was high in 1984 and 1990 at 67% and 94%, respectively. In 1996, 34% of the population was classified as decadent, which then declined to 19% in 2001, but was back up to 36% in 2006. Mountain big sagebrush occurs in scattered clumps where the soil is significantly deeper. These shrubs were moderately hedged with 80% showing poor vigor in 1996. Decadence was high in 1984, 1990, and 1996, ranging from 70% to 100%. Decadence declined in 2001 and 2006 from 20% to 0%, but the population has decreased as well, from 100 plants/acre in 2001 to 60 plants/acre in 2006. No reproduction was noted in readings before 2001 and dead plants outnumbered living ones.

True mountain mahogany numbered only 180 plants/acre in 2006, which is down from 240 plants/acre in 2001. The average mature shrub has measured 3-4 feet in height, but some plants are tall enough to be partly unavailable. Utilization was extremely heavy in 1984, when 92% of the population was heavily hedged. Since then, utilization has been mostly moderate. Annual leader growth averaged only 2.2 inches in 2001 and 3.6 inches in 2006.

Less desirable shrubs include: green rubber rabbitbrush, stickyleaf low rabbitbrush, broom snakeweed, gray horsebrush, snowberry, and Utah juniper. Point-center quarter data from 1996 estimated 40 juniper trees/acre with an average diameter of 6 inches. Broom snakeweed was the most abundant shrub in 2006 with a density of 1,520 plants/acre.

Herbaceous Understory

Herbaceous understory plants are composed of cheatgrass intermixed with Sandberg bluegrass, bluebunch

wheatgrass, and Indian ricegrass. Cheatgrass averaged 9% cover in 1996 and 5-6% in 2001 and 2006. Bluebunch wheatgrass has been increasing in abundance since 1984 and has averaged about 7% since 1996. Forbs occur infrequently and only produce about 2% total cover.

1990 TREND ASSESSMENT

The key browse species, black sagebrush and mountain big sagebrush, display downward trends because of lack of reproduction and severely hedged growth forms. The density of both populations decreased by 60% or greater in 1990. The number of true mountain mahogany remains low. The mahogany population declined 31%, while 44% of the population was classified as decadent. Broom snakeweed remains the most common species, although it did decrease by 58%. Trend for grasses is up, due to a 62% increase in the sum of nested frequency for perennial grasses. Sandberg bluegrass increased significantly in nested frequency. Trend for forbs is slightly down. Forbs are rare, but yellow salsify and lobeleaf groundsel both decreased significantly.

browse - down (-2)

grasses - up (+2)

forbs - slightly down (-1)

1996 TREND ASSESSMENT

Trend for browse is stable for true mountain mahogany and black sagebrush, but declining for mountain big sagebrush. Mountain big sagebrush has no reproduction and only moderate use, yet shows poor vigor and high decadence. Without some recruitment, mountain big sagebrush will eventually die out. However, it is only a minor component in the browse composition as it only makes up 2% of the browse cover. Black sagebrush is lightly utilized with similar vigor as noted in 1990, yet decadence has declined from 94% to 34%. The density change between 1990 and 1996 may be partly due to the larger sample used in 1996, which effectively tripled the sample size. There are high numbers of dead plants for both sagebrush species. Trend for grasses is slightly up due to a significant increase in bluebunch wheatgrass. Annual grasses were included in the sample for the first time and they are abundant with 9% cover. Trend for forbs is up even though they are not very abundant. Perennial forbs sum of nested frequency tripled due to a significant increases in cryptantha, low pentstemon, and lobeleaf groundsel. The Desirable Components Index rated this study as poor due to low browse cover, but with good perennial grass cover. Annual grass cover is moderate and is negatively affecting the score.

winter range condition (DC Index) - poor (41) Mid-level potential scale

browse - stable (0)

grasses - slightly up (+1)

forbs - up (+2)

2001 TREND ASSESSMENT

Trend for the key browse species, black sagebrush and true mountain mahogany, appear to be stable. Density of mountain mahogany remained similar to 1996 estimates, but black sagebrush declined from 1,460 plants/acre in 1996 to 1,160 plants/acre in 2001. Utilization is somewhat heavier on black sagebrush, but lighter on mahogany. Average vigor has improved on black sagebrush, while decadence has declined from 34% to 19%. Vigor of true mountain mahogany remains normal and there are no decadent plants. Mountain big sagebrush offers some additional preferred winter forage, however, it occurs in low densities (100 plants/acre), which has declined 50% since 1996. The drop in density comes entirely from the decadent age class. The remaining population is lightly browsed, shows improved vigor, and a decrease in decadence from 70% in 1996 to 20% in 2001. The shallow soil depth is a marginal site for mountain big sagebrush, especially during a drought year. Trend for grasses is stable. Sandberg bluegrass declined significantly. Cheatgrass also declined significantly and percent cover decreased from 9% to 5%. Trend for forbs is slightly down due to a significant decrease in lobeleaf groundsel. Forbs are still very minimal. The Desirable Components Index rated this study as very poor due to low browse cover, but has good perennial grass cover. Annual grass cover is moderate and is negatively affecting the score.

winter range condition (DC Index) - very poor (34) Mid-level potential scale

browse - stable (0)

grasses - stable (0)

forbs - slightly down (-1)

2006 TREND ASSESSMENT

Trend for key browse, black sagebrush and mountain mahogany, is down. Black sagebrush density decreased by 24%, from 1,160 plants/acre in 2001 to 880 plants/acre in 2006. The percentage of decadent sagebrush plants in the population increased from 19% to 36%. The very small mountain big sagebrush population continues to decline as well. Mountain mahogany density declined from 240 plants/acre in 2001 to 180 plants/acre in 2006. Utilization also increased, with 44% displaying heavy use. Trend for grasses is stable. Perennial grass sum of nested frequency and cover remained similar to 2001. Cheatgrass nested frequency increased significantly back to values similar to those from the 1996 reading, although cover remained at 5%. Trend for forbs is stable. Forbs are limited and have changed very little. The Desirable Components Index rated this study as very poor due to low browse cover, but perennial grass cover was good. Annual grass cover is moderate and negatively affected the score.

winter range condition (DC Index) - very poor (37) Mid-level potential scale
browse - down (-2) grasses - stable (0) forbs - stable (0)

HERBACEOUS TRENDS -- Management unit 02 , Study no: 27

Type	Species	Nested Frequency					Average Cover %		
		'84	'90	'96	'01	'06	'96	'01	'06
G	Agropyron spicatum	_a 30	_a 37	_b 80	_{bc} 111	_c 122	6.01	7.86	6.53
G	Bromus brizaeformis (a)	-	-	_a 9	_b 32	_b 36	.04	.67	.20
G	Bromus japonicus (a)	-	-	_a 3	_a 4	_b 31	.00	.00	.06
G	Bromus tectorum (a)	-	-	_c 315	_a 163	_b 245	8.50	5.09	4.66
G	Carex sp.	-	-	-	4	-	-	.03	-
G	Koeleria cristata	-	-	2	4	1	.06	.03	.15
G	Oryzopsis hymenoides	37	40	40	56	28	2.66	3.91	2.05
G	Poa secunda	_a 136	_c 270	_c 276	_b 182	_c 243	6.79	1.93	5.61
G	Stipa comata	_a 13	_a 3	_{ab} 21	_b 30	_{ab} 15	.85	1.02	.42
Total for Annual Grasses		0	0	327	199	312	8.54	5.77	4.92
Total for Perennial Grasses		216	350	419	387	409	16.38	14.81	14.77
Total for Grasses		216	350	746	586	721	24.93	20.58	19.70
F	Agoseris glauca	-	-	-	-	2	-	-	.01
F	Alyssum alyssoides (a)	-	-	_a 28	_a 49	_b 88	.10	.11	.19
F	Arabis sp.	_{ab} 4	_a -	_{ab} 4	_{ab} 6	_b 11	.01	.01	.02
F	Artemisia ludoviciana	-	-	-	-	4	-	-	.00
F	Astragalus convallarius	-	-	3	-	-	.01	-	.06
F	Balsamorhiza sagittata	-	-	-	-	-	-	-	.03
F	Camelina microcarpa (a)	-	-	1	4	2	.00	.07	.00
F	Calochortus nuttallii	-	-	-	1	-	-	.00	-
F	Chaenactis douglasii	3	3	4	-	1	.01	-	.00
F	Cirsium undulatum	_b 19	_{ab} 5	_a 4	_a -	_a 2	.06	-	.03
F	Crepis acuminata	-	-	-	6	2	-	.06	.18

T y p e	Species	Nested Frequency					Average Cover %		
		'84	'90	'96	'01	'06	'96	'01	'06
F	Cryptantha sp.	a ⁴	ab ¹⁵	c ⁴⁴	bc ⁴⁹	bc ⁴¹	.93	1.55	.50
F	Descurainia pinnata (a)	-	-	a ⁻	b ⁸	b ¹³	-	.02	.02
F	Draba sp. (a)	-	-	-	3	5	-	.01	.01
F	Epilobium brachycarpum (a)	-	-	ab ⁸	a ⁻	b ¹¹	.02	-	.17
F	Eriogonum umbellatum	-	-	-	2	-	-	.00	-
F	Hackelia patens	a ⁻	b ¹⁷	b ¹²	b ¹⁰	b ¹¹	.14	.02	.43
F	Holosteum umbellatum (a)	-	-	-	-	1	-	-	.00
F	Lappula occidentalis (a)	-	-	-	9	3	-	.04	.00
F	Machaeranthera grindelioides	-	-	3	3	-	.03	.03	-
F	Microsteris gracilis (a)	-	-	a ⁻	a ¹	b ²¹	-	.00	.05
F	Penstemon humilis	a ⁻	a ⁻	b ¹⁵	ab ⁸	a ⁶	.27	.01	.27
F	Phlox hoodii	-	-	4	7	9	.04	.06	.19
F	Ranunculus testiculatus (a)	-	-	-	-	3	-	-	.00
F	Senecio multilobatus	b ¹²	a ⁻	bc ²⁸	a ⁻	ab ⁴	.18	-	.06
F	Tragopogon dubius	b ¹⁴	a ⁻	ab ¹	a ⁻	ab ⁴	.00	-	.07
F	Verbascum thapsus	ab ⁸	a ⁻	b ¹⁰	ab ¹	ab ³	.10	.03	.15
Total for Annual Forbs		0	0	37	74	147	0.12	0.26	0.48
Total for Perennial Forbs		64	40	132	93	100	1.81	1.80	2.03
Total for Forbs		64	40	169	167	247	1.94	2.06	2.51

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

BROWSE TRENDS --

Management unit 02 , Study no: 27

Type	Species	Strip Frequency			Average Cover %		
		'96	'01	'06	'96	'01	'06
B	Artemisia nova	30	28	21	3.37	2.23	1.68
B	Artemisia tridentata vaseyana	9	5	3	.18	-	.63
B	Cercocarpus montanus	8	8	9	1.20	1.36	2.07
B	Chrysothamnus nauseosus consimilis	19	14	19	3.09	3.56	3.62
B	Chrysothamnus viscidiflorus viscidiflorus	12	12	10	.72	.49	.73
B	Eriogonum microthecum	0	1	2	.00	-	.03
B	Gutierrezia sarothrae	57	53	45	1.58	2.03	1.24
B	Juniperus osteosperma	1	1	1	.00	-	-
B	Symphoricarpos oreophilus	2	2	2	-	.06	.53
B	Tetradymia canescens	10	8	9	.39	.48	1.37
Total for Browse		148	132	121	10.56	10.23	11.92

CANOPY COVER, LINE INTERCEPT --

Management unit 02 , Study no: 27

Species	Percent Cover
	'06
Artemisia nova	3.79
Artemisia tridentata vaseyana	.38
Cercocarpus montanus	3.68
Chrysothamnus nauseosus consimilis	3.93
Chrysothamnus viscidiflorus viscidiflorus	.85
Gutierrezia sarothrae	1.23
Juniperus osteosperma	.20
Symphoricarpos oreophilus	1.41
Tetradymia canescens	.26

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 02 , Study no: 27

Species	Average leader growth (in)	
	'01	'06
Cercocarpus montanus	2.2	3.6

BASIC COVER --

Management unit 02 , Study no: 27

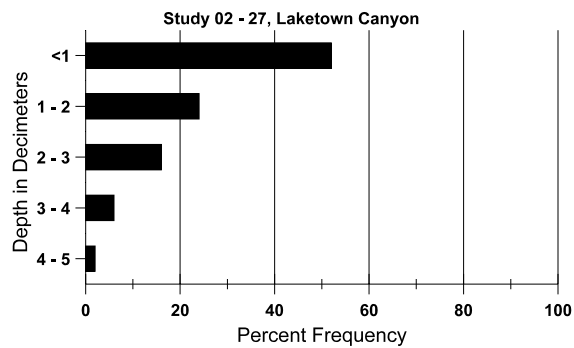
Cover Type	Average Cover %				
	'84	'90	'96	'01	'06
Vegetation	2.75	9.50	37.45	34.99	39.90
Rock	33.25	30.75	26.56	24.75	25.67
Pavement	7.00	11.25	6.03	8.76	8.51
Litter	38.00	25.25	30.82	32.23	24.31
Cryptogams	13.75	10.75	2.84	2.50	2.57
Bare Ground	5.25	12.50	7.39	14.36	14.98

SOIL ANALYSIS DATA --

Herd Unit 02, Study no: 27, Laketown Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	Loam			%OM	PPM P	PPM K	dS/m
			%sand	%silt	%clay				
11.8	58.0 (11.9)	7.6	39.2	37.4	23.4	2.4	5.6	153.6	0.8

Stoniness Index



PELLET GROUP DATA --

Management unit 02 , Study no: 27

Type	Quadrat Frequency		
	'96	'01	'06
Rabbit	6	-	4
Moose	-	-	2
Elk	1	-	-
Deer	9	5	4
Cattle	-	-	2

Days use per acre (ha)	
'01	'06
-	-
-	2 (4)
-	-
42 (103)	5 (12)
-	5 (13)

BROWSE CHARACTERISTICS --
Management unit 02 , Study no: 27

		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>												
84	1299	233	100	333	866	-	5	95	67	-	0	7/8
90	599	33	-	33	566	-	44	0	94	10	17	10/16
96	1460	20	40	920	500	360	3	0	34	14	16	15/28
01	1160	20	60	880	220	320	16	2	19	5	5	11/19
06	880	60	20	540	320	200	30	0	36	9	14	15/29
<i>Artemisia tridentata vaseyana</i>												
84	299	-	-	33	266	-	22	78	89	13	33	16/18
90	33	-	-	-	33	-	0	0	100	-	0	-/-
96	200	-	-	60	140	480	50	20	70	10	80	18/31
01	100	-	20	60	20	300	0	0	20	20	20	31/37
06	60	20	-	60	-	120	0	0	0	-	33	27/39
<i>Cercocarpus ledifolius</i>												
84	0	-	-	-	-	-	0	0	-	-	0	-/-
90	0	-	-	-	-	-	0	0	-	-	0	-/-
96	0	-	-	-	-	-	0	0	-	-	0	-/-
01	0	-	-	-	-	-	0	0	-	-	0	40/43
06	0	-	-	-	-	-	0	0	-	-	0	40/56
<i>Cercocarpus montanus</i>												
84	433	333	100	333	-	-	8	92	0	-	0	48/59
90	299	-	-	166	133	-	71	0	44	-	0	40/45
96	200	-	40	160	-	40	80	20	0	-	0	38/56
01	240	-	-	240	-	-	67	0	0	-	0	51/72
06	180	20	-	180	-	20	22	44	0	-	0	45/68
<i>Chrysothamnus nauseosus consimilis</i>												
84	332	-	66	-	266	-	70	0	80	-	0	-/-
90	399	-	-	333	66	-	0	0	17	-	0	32/26
96	620	-	20	500	100	-	0	0	16	-	23	26/41
01	420	-	-	260	160	-	0	0	38	-	0	30/48
06	520	-	40	220	260	40	23	0	50	19	19	25/43

		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 nauseosus hololeucus												
84	0	-	-	-	-	-	0	0	-	-	0	-/-
90	0	-	-	-	-	-	0	0	-	-	0	-/-
96	0	-	-	-	-	-	0	0	-	-	0	-/-
01	0	-	-	-	-	-	0	0	-	-	0	31/34
06	0	-	-	-	-	-	0	0	-	-	0	-/-
Chrysothamnus viscidiflorus viscidiflorus												
84	500	-	200	300	-	-	0	0	0	-	0	13/27
90	200	-	-	200	-	-	0	0	0	-	0	10/14
96	400	-	20	320	60	20	0	0	15	-	15	14/22
01	340	-	-	200	140	20	6	0	41	-	0	15/20
06	220	-	20	140	60	20	9	0	27	18	36	13/24
Eriogonum microthecum												
84	0	-	-	-	-	-	0	0	0	-	0	-/-
90	0	-	-	-	-	-	0	0	0	-	0	-/-
96	0	-	-	-	-	-	0	0	0	-	0	-/-
01	20	-	-	-	20	-	0	0	100	-	0	-/-
06	40	-	-	40	-	-	50	50	0	-	0	13/24
Gutierrezia sarothrae												
84	4766	-	2100	2666	-	-	0	0	0	-	0	8/9
90	1999	733	1166	500	333	-	0	0	17	2	4	13/12
96	3420	100	680	2740	-	-	0	0	0	-	0	10/11
01	3180	-	20	3140	20	-	0	0	1	-	0	8/12
06	1520	20	140	1120	260	580	1	0	17	7	7	8/12
Juniperus osteosperma												
84	0	-	-	-	-	-	0	0	-	-	0	-/-
90	0	-	-	-	-	-	0	0	-	-	0	-/-
96	20	-	20	-	-	-	0	0	-	-	0	-/-
01	20	-	-	20	-	-	0	0	-	-	0	-/-
06	20	-	20	-	-	20	0	0	-	-	0	-/-
Leptodactylon pungens												
84	66	-	-	66	-	-	0	0	-	-	0	4/4
90	0	-	-	-	-	-	0	0	-	-	0	-/-
96	0	-	-	-	-	-	0	0	-	-	0	-/-
01	0	-	-	-	-	-	0	0	-	-	0	-/-
06	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)
Ribes sp.												
84	0	-	-	-	-	-	0	0	-	-	0	-/-
90	0	-	-	-	-	-	0	0	-	-	0	-/-
96	0	-	-	-	-	-	0	0	-	-	0	-/-
01	0	-	-	-	-	-	0	0	-	-	0	-/-
06	0	-	-	-	-	-	0	0	-	-	0	30/35
Symphoricarpos oreophilus												
84	0	-	-	-	-	-	0	0	0	-	0	-/-
90	0	-	-	-	-	-	0	0	0	-	0	-/-
96	80	-	40	40	-	-	50	0	0	-	100	17/28
01	40	-	-	20	20	20	0	0	50	-	0	11/13
06	140	-	20	100	20	-	0	0	14	-	0	35/50
Tetradymia canescens												
84	66	-	33	33	-	-	0	0	0	-	0	9/10
90	100	-	-	100	-	-	0	0	0	-	0	7/7
96	280	-	20	220	40	-	0	0	14	-	50	11/20
01	300	20	-	100	200	-	0	0	67	-	0	10/17
06	300	-	60	160	80	20	33	7	27	7	7	10/17