

Trend Study 27-3-08

Study site name: Whiteman Bench .

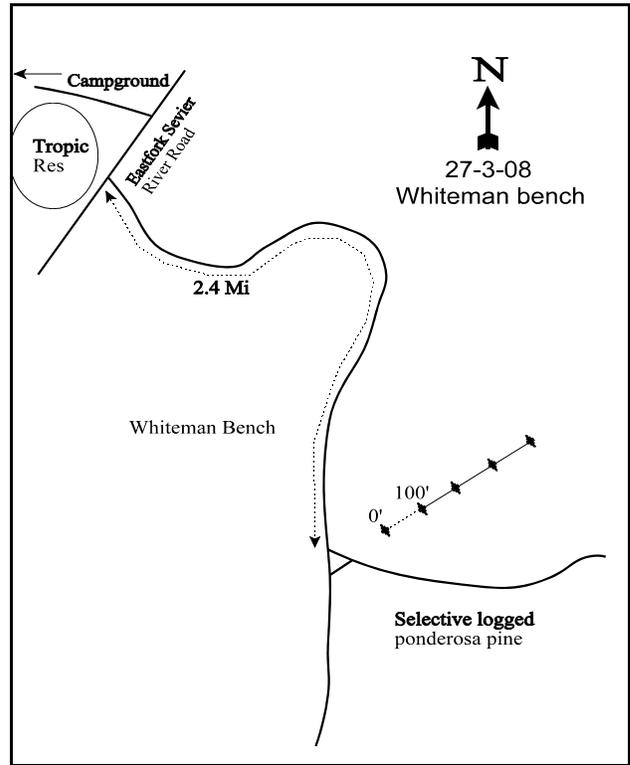
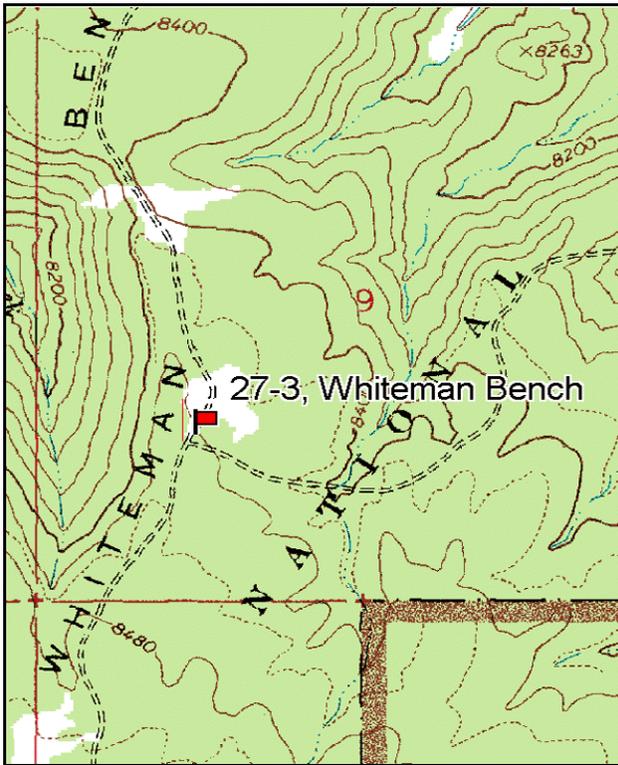
Vegetation type: Selective Logged-Ponderosa .

Compass bearing: frequency baseline 60 degrees magnetic.

Frequency belt placement: line 1 (11 & 71ft), line 2 (34ft), line 3 (59ft), line 4 (95ft). Rebar: belt 5 on 11ft.

LOCATION DESCRIPTION

East of the Tropic Reservoir Dam on the E. Fork Sevier River Road, take the Whiteman Bench road east for 2.40 miles to a fork in the road. Stop here. Walk east 18 paces to the first stake, a red-painted fencepost 18" high marked with browse tag #7153. The frequency baseline runs NE from here.



Map Name: Bryce Point

Diagrammatic Sketch

Township 37S, Range 4W, Section 9

GPS: NAD 83, UTM 12S 391137 E 4162028 N

DISCUSSION

Whiteman Bench - Trend Study No. 27-3

Study Information

This study is on a large, level bench area east of Tropic Reservoir [elevation: 8,400 feet (2,560 m), slope: 2%-3%, aspect: northeast]. Most of the bench is covered with ponderosa pine (*Pinus ponderosa*) in varying stages of growth due to logging activities. The study samples a moderate aged stand of ponderosa that was clear cut more than 20 years ago. The understory is a mixture of shrubs and grasses. The area is utilized as summer range by deer and elk. Little livestock use occurs in the timbered areas of the East Fork allotment. Pellet group transect data collected estimated deer use to be moderate in 2003 and 2008 (24 ddu/acre:60 ddu/ha, respectively). Elk use was estimated to be light in 2003 (12 edu/acre:30 edu/ha) and moderate in 2008 (29 edu/acre:73 edu/ha). There was no sign of cattle detected in 2003, and only 1 cattle pat encountered in 2008.

Soil

The soil has moderate depth with an effective rooting depth estimated at 13 inches. Soil texture is a clay loam with a considerable amount of cobble rock in the profile. Soils are neutral in reactivity with (pH of 6.9). Phosphorus has marginal availability for plant growth and development at 7.6 ppm (Tiedemann and Lopez 2004). Relative combined vegetation and litter cover has been high with 73% in 1992, 71% in 1997 and 2003, and 77% in 2008. Relative bare ground cover has been moderate with 17% in 1992, 16% in 1997, 20% in 2003, and 13% in 2008. The erosion condition rating was classified as stable, in 2003 and 2008.

Browse

The ponderosa canopy is fairly open, although the trees appear to have increased in size since the site was first photographed in 1981. Line-intercept canopy cover was estimated at 17% in 2003, and 23% in 2008. The open ponderosa forest is at a relatively low density estimated at 50-60 mature trees/acre in 1997, 2003, and 2008, and appears to have little effect on the shrub understory.

The most abundant and important browse species are black sagebrush (*Artemisia nova*), bitterbrush (*Purshia tridentata*), and dwarf rabbitbrush (*Chrysothamnus depressus*). Dwarf rabbitbrush accounted for half of the total browse cover in 1997, 37% in 2003, and 44% in 2008. Density estimates for dwarf rabbitbrush have been very high ranging from about 11,000-22,000 plants/acre since 1992. These plants are very small averaging only seven inches in height, but vigor has been good in all surveys. Use was mostly light from 1987 to 2003, but was more moderate in 2008.

Bitterbrush provides less than a quarter of the total browse cover, but provides the most preferred forage. Density of bitterbrush has steadily increased from 620 plants/acre in 1997 to 820 plant/acre in 2008. There were few seedlings and young bitterbrush plants encountered in 1997, 2003, and 2008. Decadence of bitterbrush was low from 1987-1997(6%-16%), increasing to 39% in 2003, then decreasing to 17% in 2008. Bitterbrush shows moderate to heavy utilization from the 1987 to 2003 surveys, decreasing to light to moderate use in 2003, and has maintained good vigor. The black sagebrush population remained around 1,400 plants/acre in 1997 and 2003, and increased to 1,760 plants/acre in 2008. The population had fairly low decadence at less than 20% in 1997 and 2003 and showed improving vigor in both years as well. Decadence increased to 43% and plants showing poor vigor increased to 16% in 2008. Utilization of black sagebrush was light to moderate in 1992, but mostly light in all other sampling years. Other browse sampled on the site include Parry rabbitbrush (*Chrysothamnus parryi*), squaw currant (*Ribes cereum* ssp. *inebrians*), snowberry (*Symphoricarpos oreophilus*), and gray horsebrush (*Tetradymia canescens*).

Herbaceous Understory

The herbaceous understory is not particularly abundant on this site. Grasses and forbs combined to produce 16% total cover in 1992, 8% in 1997, 11% in 2003, and 15% in 2008. The most abundant herbaceous species

is by far rock goldenrod (*Petradoria pumila*). This species provided 28% of the total herbaceous cover in 1992, 46% in 1997, 61% in 2003, and 45% in 2008. Mutton bluegrass (*Poa fendleriana*) was very abundant in 1987, but declined in 1992, and again in 1997. Mutton bluegrass frequency and density has remained relatively constant since 1997. Other grasses include thickspike wheatgrass (*Agropyron dasystachyum*), needle-and-thread grass (*Stipa comata*), Letterman needlegrass (*Stipa lettermani*), and a sedge (*Carex* sp.). Other forbs sampled on the site include fendler sandwort (*Arenaria fendleri*), pacific aster (*Aster chilensis*), and redroot eriogonum (*Eriogonum racemosum*).

1992 TREND ASSESSMENT

The browse trend is stable with good vigor for most species. Density differences may be due to different sampling sizes from the last reading. Only black sagebrush has a high rate of decadence, but the young age class makes up 26% of the population. This should compensate for any possible losses in the future. Trend for the grasses is slightly down with a decrease in the sum of nested frequency of perennial grasses. The trend for forbs is up with a large increase in the sum of nested frequency of perennial forbs. Forbs account for 57% of the herbaceous cover.

browse - stable (0)

grass - slightly down (-1)

forb - up (+2)

1997 TREND ASSESSMENT

Trend for browse is slightly down. The three key species on this site, black sagebrush, dwarf rabbitbrush, and bitterbrush, have all declined substantially in population density. Vigor is generally good, and decadence is low. Trend for the grasses and forbs is down. Sum of nested frequency for grasses and forbs has declined substantially since 1992. The only grass species to show an increase in nested frequency since 1992 is thickspike wheatgrass, all others declined. In addition, all forb species showed a decline in nested frequency since 1992.

browse - slightly down (-1)

grass - down (-2)

forb - down (-2)

2003 TREND ASSESSMENT

Trend for browse is stable. Dwarf rabbitbrush, black sagebrush, and bitterbrush all show stable densities. Bitterbrush decadence increased to 39%, but decadence for the other species is low. As this is summer range for big game, the browse component is less important than the herbaceous understory. The trend for grasses is down. The sum of nested frequency of perennial grasses continues to decline and production of perennial grasses was low at just over 2% of total cover. The trend for forbs is stable. The sum of nested frequency of perennial forbs remained similar to 1997, but the dominant forb is rock goldenrod, which is not highly preferred for forage. Production of perennial forbs did increase from around 5% of cover in 1997 to near 8%. The understory is likely suffering the effects of drought, but the abundance of dwarf rabbitbrush and heavy litter accumulations underneath the ponderosa pine are probably also having a negative effect on understory production.

browse - stable (0)

grass - down (-2)

forb - stable (0)

2008 TREND ASSESSMENT

Trend for browse is stable. The preferred browse species, antelope bitterbrush, has been steadily increasing in density since 1997 to a current density of 820 plants/acre. Decadence of bitterbrush decreased from 39% in 2003 to 17%, vigor has remained good in most bitterbrush plants. Recruitment of new bitterbrush remains fairly low with young plants comprising only 5% of the population. Dwarf rabbitbrush density decreased by 26% since 2003 to 11,160 plant/acre. Vigor was good on most plants in the population, but decadence increased to a high of 16%, up from 6% in 2003. Black sagebrush density increased 24% since 2003 to 1,760 plant/acre. Plants displaying poor vigor also increased to 16%, up from 7% in 2003. Decadence increased from 16% in 2003 to 43%. Trend for grasses was up. The sum of nested frequency of perennial grasses

increased, as did production of perennial grasses from 2% of cover in 2003 to almost 6%. The largest change was a significant increase in the frequency of thickspike wheatgrass as well as an increase in its production. The trend for forbs is stable. There was just a slight increase in both the sum of nested frequency and production of perennial forbs, but each remained relatively constant.

browse - stable (0)

grass - up (+2)

forb - stable (0)

HERBACEOUS TRENDS --
Management unit 27 , Study no: 3

T y p e	Species	Nested Frequency					Average Cover %			
		'87	'92	'97	'03	'08	'92	'97	'03	'08
G	Agropyron dasystachyum	a-	b36	c72	b21	c74	.25	.33	.21	1.07
G	Carex sp.	57	47	35	30	39	.64	.74	.37	.72
G	Koeleria cristata	12	31	26	13	19	.42	.22	.12	.21
G	Oryzopsis hymenoides	b21	a3	a-	a-	a3	.01	-	-	.00
G	Poa fendleriana	bc209	c148	ab75	a67	ab77	3.20	.93	.70	1.18
G	Poa secunda	-	-	3	-	3	-	.00	-	.00
G	Sitanion hystrix	c87	b30	a9	ab22	a3	.14	.05	.13	.00
G	Stipa comata	a19	b57	b53	b53	b50	1.04	.61	.49	1.50
G	Stipa sp.	3	4	-	-	-	.03	-	-	-
G	Stipa lettermani	b93	b88	a51	a50	a46	.93	.50	.40	1.11
Total for Annual Grasses		0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		501	444	324	256	314	6.68	3.42	2.43	5.83
Total for Grasses		501	444	324	256	314	6.68	3.42	2.43	5.83
F	Agoseris glauca	-	2	-	7	-	.01	-	.07	-
F	Antennaria rosea	2	7	3	5	6	.03	.00	.01	.06
F	Androsace septentrionalis (a)	-	a2	a-	b17	a3	.00	-	.03	.00
F	Arabis demissa	ab10	b15	b11	ab7	a-	.04	.02	.02	-
F	Arenaria fendleri	a33	b93	ab64	a40	a49	2.65	.48	.54	.51
F	Artemisia ludoviciana	5	3	-	3	-	.03	-	.15	-
F	Arabis pulchra	-	11	-	-	-	.02	-	-	-
F	Aster chilensis	a25	b71	a29	a14	a17	.51	.10	.11	.05
F	Astragalus humistratus	b11	ab6	a-	a-	a-	.05	.00	-	-
F	Calochortus nuttallii	a-	ab1	a-	b7	ab2	.00	-	.02	.00
F	Chenopodium leptophyllum(a)	-	-	-	-	-	-	-	-	.00
F	Cirsium sp.	-	1	1	1	-	.03	.03	.00	-
F	Crepis acuminata	-	3	4	3	3	.03	.01	.03	.03
F	Cruciferae	8	-	-	-	-	-	-	-	-
F	Cryptantha sp.	-	1	-	3	6	.00	-	.00	.01
F	Descurainia pinnata (a)	-	-	-	3	-	-	-	.00	-

Type	Species	Nested Frequency					Average Cover %			
		'87	'92	'97	'03	'08	'92	'97	'03	'08
F	<i>Erysimum asperum</i>	_b 18	_a -	_a -	_a -	_a -	-	-	-	-
F	<i>Erigeron flagellaris</i>	_{ab} 7	_b 19	_a 1	_a 3	_{ab} 11	.34	.00	.00	.12
F	<i>Erigeron</i> sp.	5	-	-	-	-	-	-	-	-
F	<i>Erigeron pumilus</i>	5	-	3	-	4	-	.00	-	.01
F	<i>Eriogonum racemosum</i>	_{ab} 24	_b 38	_{ab} 29	_a 17	_a 18	.29	.15	.11	1.05
F	<i>Eriogonum umbellatum</i>	-	3	-	-	-	.03	-	-	-
F	<i>Hymenoxys richardsonii</i>	-	-	-	-	-	.03	-	-	-
F	<i>Ipomopsis aggregata</i>	6	4	5	-	-	.01	.01	-	-
F	<i>Lappula occidentalis</i> (a)	-	-	_a -	_b 16	_a 3	-	-	.49	.00
F	<i>Linum kingii</i>	-	-	-	-	1	-	-	-	.00
F	<i>Lychnis drummondii</i>	-	1	-	-	-	.00	-	-	-
F	<i>Orthocarpus luteus</i> (a)	5	21	4	2	15	.09	.01	.01	.20
F	<i>Penstemon caespitosus</i>	-	7	3	-	6	.09	.00	.00	.04
F	<i>Pedicularis centranthera</i>	-	-	-	8	7	-	-	.07	.20
F	<i>Penstemon</i> sp.	5	6	3	3	3	.05	.03	.03	.03
F	<i>Petradoria pumila</i>	_a 88	_{ab} 112	_a 95	_{bc} 135	_c 147	4.47	3.85	6.59	6.41
F	<i>Phlox longifolia</i>	_a -	_b 15	_a -	_a -	_a 3	.04	-	-	.00
F	<i>Potentilla crinita</i>	_a -	_b 15	_a -	_a 1	_a -	.19	-	.00	-
F	<i>Polygonum douglasii</i> (a)	-	_b 31	_b 29	_a 8	_a 2	.07	.11	.02	.01
F	<i>Senecio multilobatus</i>	-	-	-	1	-	-	-	.00	-
F	<i>Taraxacum officinale</i>	-	-	1	-	-	-	.00	-	-
F	<i>Tragopogon dubius</i>	4	-	-	-	2	-	-	-	.00
F	Unknown forb-perennial	1	-	-	1	-	-	-	.00	-
Total for Annual Forbs		5	54	33	46	23	0.17	0.12	0.56	0.23
Total for Perennial Forbs		257	434	252	259	285	8.98	4.74	7.80	8.56
Total for Forbs		262	488	285	305	308	9.16	4.86	8.37	8.79

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

BROWSE TRENDS --

Management unit 27 , Study no: 3

Type	Species	Strip Frequency				Average Cover %			
		'92	'97	'03	'08	'92	'97	'03	'08
B	Artemisia nova	35	32	31	34	2.03	1.16	1.49	.76
B	Ceanothus fendleri	0	0	1	0	-	-	.00	-
B	Chrysothamnus depressus	98	89	87	81	8.31	7.23	7.58	5.68
B	Chrysothamnus parryi attenuatus	36	3	33	21	.41	.03	.64	.63
B	Gutierrezia sarothrae	12	1	7	19	.04	.00	.01	.43
B	Mahonia repens	3	0	0	1	.04	.00	-	.00
B	Pinus ponderosa	6	4	4	5	11.14	2.20	6.71	.76
B	Purshia tridentata	39	24	22	27	5.21	2.91	2.89	3.98
B	Ribes cereum inebrians	4	1	1	1	.00	.00	.15	.15
B	Symphoricarpos oreophilus	8	9	5	7	.85	.81	.63	.38
B	Tetradymia canescens	20	8	15	15	.24	.06	.24	.19
Total for Browse		261	171	206	211	28.30	14.41	20.36	12.98

CANOPY COVER, LINE INTERCEPT --

Management unit 27 , Study no: 3

Species	Percent Cover		
	'97	'03	'08
Artemisia nova	-	1.96	1.14
Chrysothamnus depressus	-	6.94	9.53
Chrysothamnus parryi attenuatus	-	.38	.68
Gutierrezia sarothrae	-	.03	.41
Pinus ponderosa	4.40	16.96	23.00
Purshia tridentata	-	3.21	6.30
Ribes cereum inebrians	-	.68	.56
Symphoricarpos oreophilus	-	.16	.53
Tetradymia canescens	-	.10	.13

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 27 , Study no: 3

Species	Average leader growth (in)	
	'03	'08
Artemisia nova	1.5	0.7
Purshia tridentata	3.0	2.5

POINT-QUARTER TREE DATA --

Management unit 27 , Study no: 3

Species	Trees per Acre		Average diameter (in)	
	'03	'08	'03	'08
Pinus ponderosa	50	60	9.6	11.1

BASIC COVER --

Management unit 27 , Study no: 3

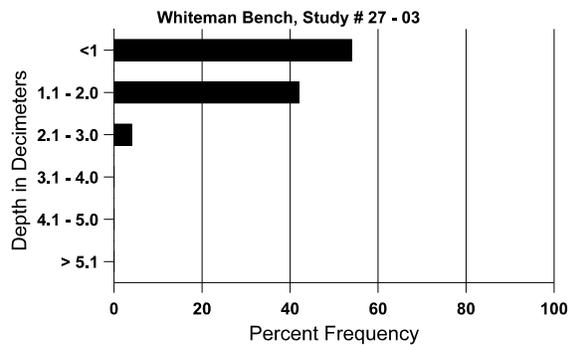
Cover Type	Average Cover %				
	'87	'92	'97	'03	'08
Vegetation	2.00	42.34	29.83	28.45	28.42
Rock	8.75	12.57	8.37	10.07	7.85
Pavement	4.25	0	4.80	.56	2.92
Litter	75.75	49.28	47.95	51.08	59.22
Cryptogams	.25	.99	1.81	.03	.05
Bare Ground	9.00	20.97	17.22	21.93	15.10

SOIL ANALYSIS DATA --

Management unit 27, Study no: 3, Study Name: Whiteman Bench

Effective rooting depth (in)	Temp °F (depth)	pH	clay loam			%OM	PPM P	PPM K	dS/m
			%sand	%silt	%clay				
13.0	69.7 (6.0)	6.9	36.4	32.1	31.6	3.6	7.6	163.2	0.6

Stoniness Index



PELLET GROUP DATA --

Management unit 27 , Study no: 3

Type	Quadrat Frequency			
	'92	'97	'03	'08
Rabbit	6	-	3	14
Elk	3	8	9	6
Deer	6	7	7	19
Cattle	-	-	-	2

Days use per acre (ha)	
'03	'08
-	-
12 (30)	29 (72)
24 (60)	26 (65)
-	1 (2)

BROWSE CHARACTERISTICS --

Management unit 27 , Study no: 3

		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	2398	133	299	2033	66	-	3	0	3	-	22	11/9
92	2020	1060	520	720	780	-	44	3	39	2	19	-/-
97	1380	-	140	980	260	300	0	0	19	9	13	13/25
03	1340	-	100	1020	220	200	1	0	16	7	7	14/18
08	1760	120	440	560	760	200	0	0	43	15	16	12/18
<i>Ceanothus fendleri</i>												
87	432	-	199	233	-	-	0	0	-	-	0	4/14
92	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	10/48
03	20	-	-	20	-	-	0	0	-	-	0	7/24
08	0	-	-	-	-	-	0	0	-	-	0	6/7
<i>Chrysothamnus depressus</i>												
87	8198	133	799	7366	33	-	1	0	0	-	.81	4/7
92	21840	780	3340	16960	1540	-	15	2	7	.18	4	-/-
97	13380	40	780	12320	280	40	.14	0	2	1	1	5/13
03	14980	-	420	13680	880	680	10	10	6	2	2	5/9
08	11160	140	300	9120	1740	60	43	8	16	1	3	4/10
<i>Chrysothamnus parryi attenuatus</i>												
87	1132	-	166	966	-	-	0	0	0	-	0	6/5
92	1460	40	500	440	520	-	29	15	36	-	8	-/-
97	80	-	20	40	20	-	0	0	25	-	0	7/10
03	1220	-	40	1120	60	-	8	10	5	3	5	7/11
08	1160	-	-	1140	20	-	5	0	2	-	0	7/13

		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)
Gutierrezia sarothrae												
87	499	-	-	499	-	-	0	0	0	-	0	6/5
92	380	40	20	360	-	-	5	0	0	-	5	-/-
97	60	-	40	20	-	-	0	0	0	-	0	-/-
03	400	-	320	80	-	-	0	0	0	-	0	5/5
08	1240	80	20	840	380	20	0	0	31	2	2	6/8
Mahonia repens												
87	2099	33	2033	66	-	-	0	0	-	-	0	5/9
92	280	140	260	20	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	4/5
08	40	-	-	40	-	-	0	0	-	-	0	4/6
Pinus ponderosa												
87	165	-	66	99	-	-	0	0	-	-	20	367/144
92	120	20	40	80	-	-	0	0	-	-	0	-/-
97	80	-	20	60	-	-	0	0	-	-	0	-/-
03	80	-	20	60	-	20	0	0	-	-	0	-/-
08	100	-	-	100	-	-	0	0	-	-	0	-/-
Purshia tridentata												
87	1132	233	433	633	66	-	68	6	6	-	6	15/23
92	1820	140	820	820	180	-	38	19	10	-	4	-/-
97	620	40	80	440	100	-	52	6	16	-	0	14/41
03	720	-	20	420	280	-	36	61	39	-	0	16/38
08	820	20	40	640	140	-	24	2	17	-	0	15/39
Ribes cereum inebrians												
87	99	-	-	99	-	-	0	0	0	-	0	26/29
92	160	20	100	40	20	-	75	0	13	-	0	-/-
97	20	-	-	20	-	-	0	0	0	-	0	39/57
03	20	-	-	20	-	-	100	0	0	-	0	45/58
08	20	-	-	-	20	-	0	0	100	-	0	38/49
Symphoricarpos oreophilus												
87	99	-	-	99	-	-	0	100	0	-	0	15/20
92	300	20	160	120	20	-	13	40	7	-	0	-/-
97	240	-	60	180	-	-	8	0	0	-	0	17/41
03	300	-	60	240	-	-	33	27	0	-	0	13/25
08	320	-	20	280	20	-	63	0	6	-	0	10/30

		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)
Tetradymia canescens												
87	66	-	33	33	-	-	0	0	0	-	50	8/6
92	540	20	240	180	120	-	22	4	22	-	0	-/-
97	200	-	60	140	-	-	0	0	0	-	0	7/8
03	420	-	80	340	-	-	0	0	0	-	0	9/11
08	340	20	60	260	20	-	6	0	6	-	6	7/10