

Trend Study 25A-16-04

Study site name: Tommy Hollow .

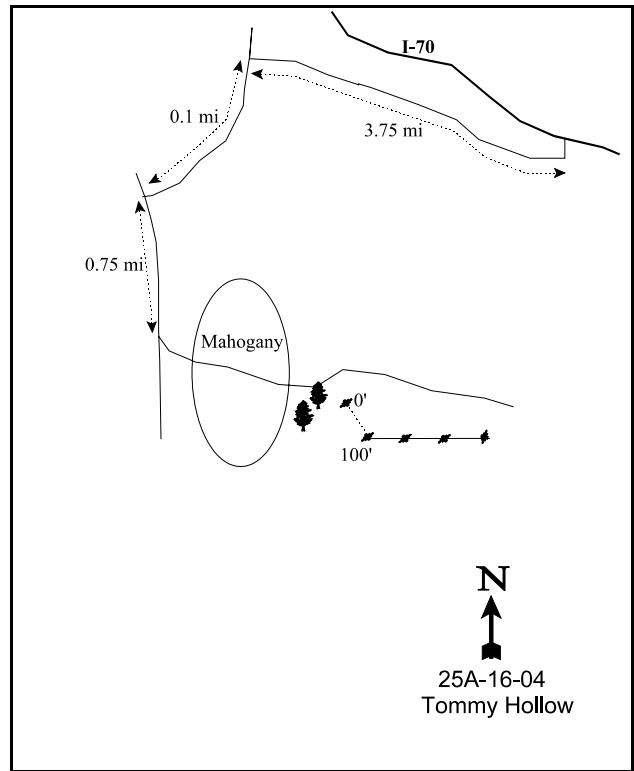
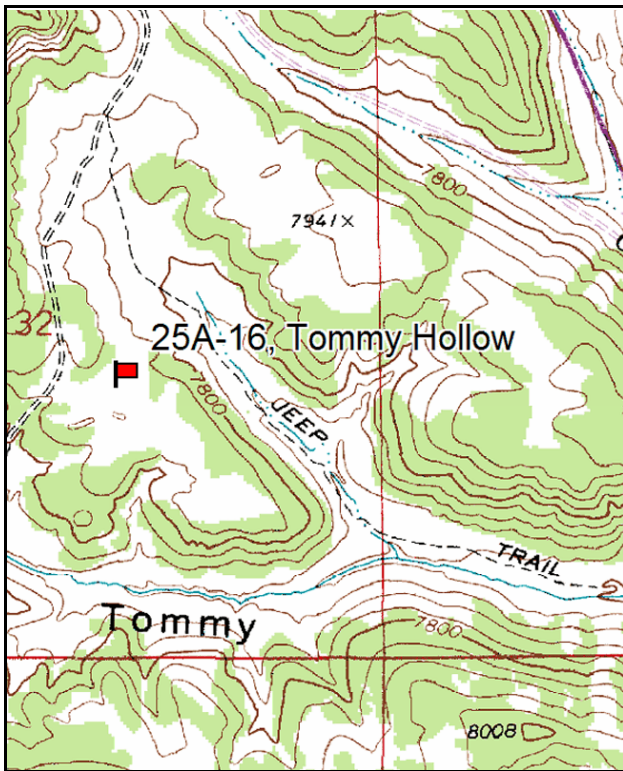
Vegetation type: Wyoming Big Sagebrush .

Compass bearing: frequency baseline 167 degrees magnetic.

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

LOCATION DESCRIPTION

Take I-70 east for about 37.5 miles from Salina to a rest area exit. From the exit, turn right once, then right again to go west on the frontage road paralleling the freeway. Drive on the frontage road for 3.75 miles to a road (FS #013) turning left. Take this left turn and proceed 0.1 miles to a “T” in the road, turn left again and go south for 0.75 miles to the crest of the second hill. On the crest there is an old jeep trail turning left and going down the top of the hill. This road goes through a small clearing at the intersection, then through a thick patch of mahogany and junipers. The transect begins in the next sage clearing beyond the trees, about 50 feet past two pinyons standing beside each other near the edge of the clearing. The transect is marked with 2-1/2 foot tall rebar. The 0-foot baseline stake has a red browse tag #7193 attached.



Map Name: Old Woman Plateau, Utah

Diagrammatic Sketch

Township 23S , Range 4E , Section 32

GPS: NAD 27, UTM 12S 4290475 N, 457846 E

DISCUSSION

Tommy Hollow - Trend Study No. 25A-16

Tommy Hollow is located on the low rolling mountains about one mile south of Emigrant Pass on I-70 at about 7,800 feet. It samples a flat that is dominated by sagebrush and grass and surrounded by pinyon and juniper trees and curlleaf mountain mahogany. This study is located in the Forest Service Beaver Dams allotment which is a grazed in early June and July. Cattle were seen on site in July of 1985. In 1985, there were also signs to indicate that elk and deer use the site in winter. Pellet group data in 1991 estimated 42 deer and 15 elk days use/acre (103 ddu/ha, 38 edu/ha). Pellet group data from 1999 estimated 96 deer, 93 elk and 9 cow days use/acre (237 ddu/ha, 229 edu/ha, 22 cdu/ha). Most of the deer and elk pellet groups were from winter use. Rabbit sign was also very common. In 2004, wildlife use was lower with an estimated 12 deer, 13 elk, and 9 cow days use/acre (30 ddu/ha, 33 edu/ha, 21 cdu/ha). Rabbit sign was very abundant in 2004.

The soil is relatively deep with an effective rooting depth estimated at nearly 19 inches. It is a sandy clay loam with a slightly acid pH (6.5). Phosphorus is limiting at only 4.1 ppm. Values less than 10 ppm may limit normal plant growth and development. There is a hard clay layer in some areas at about 4 to 6 inches in depth. The soil penetrometer was able to penetrate the layer but it must be limiting to root development since black sagebrush is found in these areas. The soil surface has little rock or pavement cover and there is a high amount of bare soil exposed in the shrub interspaces. Erosion is moderate with a high amount of pedestaling.

The key species in the flat are mountain big sagebrush and black sagebrush. Some of the changes in density of sagebrush between 1991 and 1999 are due to the much larger sample used in 1999. Mountain big sagebrush cover declined from about 13% in 1999 to almost 11% in 2004. Density declined 37% from 6,880 plants/acre in 1999 to 4,340 plants/acre in 2004. Decadence increased from 21% to 37%. Plants classified as dying increased from 3% to 24%. Prior to 2004, young plants made up at least 29% of the population, but this dropped to only 7% in 2004. Utilization has been moderate with each reading. It appears drought has caused a decline in this population. Black sagebrush density has declined with each reading. Density declined 19% in 2004 to 6,280 plants/acre. The number of mature plants remained stable. Decadency only increased from 9% to 17%, but the number of young plants declined dramatically. Prior to 2004 young plants made up at least 24% of the population, but was only 1% in 2004. Utilization has been light, with some moderate to heavy use in 1991.

Several other desirable browse species available on or near the site include winterfat, bitterbrush, curlleaf mountain mahogany, and Utah serviceberry. Besides providing variety in forage, the nearby curlleaf mountain mahogany and pinyon-juniper stands provide good protective cover. Bitterbrush occurs in low numbers and receives moderate to heavy use. The entire population was classified as decadent in 1991, but improved to 33% in 1999 and to only 14% in 2004. It appears there was some confusion with identification of rabbitbrush and broom snakeweed in 1985 and 1991. Stickyleaf low rabbitbrush density declined 43% from 12,580 plants/acre in 1999 to 7,120 plants/acre in 2004. Broom snakeweed density also declined between 1999 and 2004 from 5,780 plants/acre to 2,060 plants/acre.

The understory vegetation is composed of a variety of grasses and forbs. Common grasses include mutton bluegrass, bottlebrush squirreltail, blue grama, and western wheatgrass. Blue grama and bottlebrush squirreltail decreased significantly in nested frequency in 2004, but sedge, mutton bluegrass, and sandberg bluegrass significantly increased. Increases in perennial herbaceous species were rare in 2004 for southeastern Utah. Mutton bluegrass increased from 5% to 6% cover. Forbs are diverse but most species occur only

occasionally. The most abundant forb was the low growing pussytoes which had over 2% cover in 1999, but in 2004 it decreased significantly in nested frequency and cover was only 0.2%.

1985 APPARENT TREND ASSESSMENT

Basically, the range trend appears stable to slightly down. There is a minimal amount of erosion which will not be a problem unless the ground is severely disturbed. Species diversity is high and the key species are vigorous and reproducing. Increaser species should be monitored closely as an indication of deteriorating range conditions.

1991 TREND ASSESSMENT

Soil trend would be considered improving since 1985 because there is less bare ground, but still considered a stable trend. However, it is still considered in poor condition because percent bare ground is still relatively high at 34%. Key browse species (mountain big sagebrush and black sagebrush) have shown some notable changes. The black sagebrush population has decreased by 12%, but it was already over 10,000 plants per acre. Percent decadency has gone from 7% to 55%. This would be expected with the prolonged drought. Mountain big sagebrush has increased dramatically. Density has more than doubled, but percent decadency has gone up from 6% to 51%. With increased moisture, this decadency rate would be expected to go decrease. Broom snakeweed was picked up in 1991 with an estimated population of 133 plants per acre. Browse trend would be considered slightly down. The principal grass species have been stable since 1985, with the exception of western wheatgrass which has gone from an 8% to 33% quadrat frequency. The forbs are stable with some losses and some gains, depending on their tolerance to drought.

TREND ASSESSMENT

soil - stable (3), but in poor condition

browse - slightly down (2)

herbaceous understory - stable (3)

1999 TREND ASSESSMENT

Trend for soil is stable to slightly improving, but still poor condition. Relative percent bare ground has decreased but litter cover has also gone down. There is little erosion occurring on the site due to the high vegetation cover combined with the gentle terrain. Trend for the key species, mountain big sagebrush and black sagebrush, is considered stable. The populations contain few dead plants indicating that the difference in densities between 1991 and 1999 is mainly due to the much larger sample now used which gives more accurate estimates for browse densities. Both populations show light to moderate use, improved vigor, and declining decadence. Both populations also show good young recruitment. Another positive aspect of the browse trend is the improvement in vigor for bitterbrush. During the 1991 reading, all of the bitterbrush were decadent and showed poor vigor. Now all show normal vigor and only 33% of the plants are considered decadent. Trend for the herbaceous understory is down slightly. Sum of nested frequency of grasses has declined slightly while nested frequency of perennial forbs has declined considerably. Nested frequency of *Carex* and bottlebrush squirreltail declined significantly while mutton bluegrass increased significantly. The forb composition is diverse but low growing species pussytoes, low fleabane, and desert phlox are the most abundant.

TREND ASSESSMENT

soil - stable to slightly improving (4)

browse - up slightly (4)

herbaceous understory - down slightly (2)

winter range condition (DC Index) - 85 (good) Mountain brush type

2004 TREND ASSESSMENT

The soil trend is stable. Bare ground, litter, and vegetation cover have remained stable since 1999. Bare ground is high and moderate erosion is occurring. The browse trend is slightly down. Mountain big sagebrush and black sagebrush densities decreased substantially since 1999. The percentage of young plants decreased for each species and decadency increased. There are not currently enough young plants to replace those that are dying. This could improve with a return to normal precipitation patterns. Other palatable browse species such as Utah serviceberry, bitterbrush, curlleaf mountain mahogany, and winterfat are stable. Broom snakeweed and stickyleaf low rabbitbrush have decreased in density, which is positive. The herbaceous understory is stable, which is good considering the drought conditions that have affected this area four of the past five years. Herbaceous species have been negatively affected on most other sites in 2004. Sum of nested frequency is slightly up for perennial grasses, while it is slightly down for perennial forbs.

TREND ASSESSMENT

soil - stable, but poor (3)

browse - down slightly (2)

herbaceous understory - stable (3)

winter range condition (DC Index) - 68 (fair to good) Mountain brush type

HERBACEOUS TRENDS --

Management unit 25A, Study no: 16

Type	Species	Nested Frequency				Average Cover %	
		'85	'91	'99	'04	'99	'04
G	Agropyron smithii	a ₁₉	b ₈₄	b ₁₀₉	b ₉₀	1.16	1.09
G	Bouteloua gracilis	b ₁₁₆	b ₁₁₇	b ₉₁	a ₅₁	1.48	1.08
G	Bromus tectorum (a)	-	-	2	-	.00	-
G	Carex spp.	c ₂₆₉	c ₂₆₄	a ₂₇	b ₁₅₃	.69	1.56
G	Festuca ovina	b ₁₁	a ₋	c ₆₂	a ₄	.84	.06
G	Oryzopsis hymenoides	b ₇₂	a ₈	a ₄	a ₋	.01	-
G	Poa fendleriana	a ₂₃	a ₃₀	b ₁₇₄	c ₂₂₀	4.87	6.17
G	Poa pratensis	-	-	-	9	-	.12
G	Poa secunda	ab ₉	a ₋	a ₂	b ₁₇	.00	.06
G	Sitanion hystrix	ab ₁₄₂	c ₁₆₆	b ₁₁₀	a ₆₈	2.10	2.15
G	Stipa comata	8	5	5	-	.07	.00
G	Stipa lettermani	a ₈	a ₁₄	b ₅₂	b ₄₉	1.18	.71
Total for Annual Grasses		0	0	2	0	0.00	0
Total for Perennial Grasses		677	688	636	661	12.42	13.03
Total for Grasses		677	688	638	661	12.43	13.03
F	Agoseris glauca	-	5	-	-	-	-
F	Allium spp.	1	-	2	-	.03	-
F	Antennaria rosea	a ₁₄	b ₇₄	a ₂₇	a ₁₆	2.40	.20
F	Androsace septentrionalis (a)	-	-	28	20	.07	.08
F	Arabis demissa	b ₄₇	b ₁₁₆	a ₁₃	a ₂	.03	.00

Type	Species	Nested Frequency				Average Cover %	
		'85	'91	'99	'04	'99	'04
F	<i>Astragalus convallarius</i>	-	-	1	6	.03	.03
F	<i>Astragalus</i> spp.	1	1	9	4	.22	.03
F	<i>Astragalus utahensis</i>	-	-	-	2	-	.00
F	<i>Castilleja chromosa</i>	1	1	3	-	.01	-
F	<i>Calochortus nuttallii</i>	_a 23	_b 50	_a 5	_a -	.01	-
F	<i>Collinsia parviflora</i> (a)	-	-	-	6	-	.01
F	<i>Crepis acuminata</i>	-	2	-	-	-	-
F	<i>Cymopterus</i> spp.	-	3	-	-	-	-
F	<i>Descurainia pinnata</i> (a)	-	-	-	1	-	.00
F	<i>Erigeron eatonii</i>	_a 6	_a 1	_{ab} 13	_b 22	.08	.09
F	<i>Erigeron flagellaris</i>	-	-	-	4	-	.01
F	<i>Erigeron pumilus</i>	_a 110	_b 39	_a 14	_a 13	.03	.09
F	<i>Eriogonum racemosum</i>	_a 3	_a -	_b 13	_{ab} 10	.13	.13
F	<i>Hymenoxys richardsonii</i>	_a -	_a -	_b 13	_b 17	.18	.18
F	<i>Ipomopsis aggregata</i>	-	-	3	-	.03	-
F	<i>Machaeranthera canescens</i>	-	1	2	-	.01	-
F	<i>Microsteris gracilis</i> (a)	-	-	-	3	-	.01
F	<i>Penstemon comarrhenus</i>	-	-	-	3	-	.01
F	<i>Penstemon</i> spp.	-	-	8	5	.07	.06
F	<i>Penstemon pachyphyllus</i>	3	2	2	-	.06	-
F	<i>Phlox austromontana</i>	_a 2	_a -	_b 21	_{ab} 10	.22	.22
F	<i>Phlox longifolia</i>	-	-	-	3	-	.00
F	<i>Polygonum douglasii</i> (a)	-	-	9	24	.02	.05
F	<i>Potentilla gracilis</i>	-	-	3	-	.00	-
F	<i>Ranunculus testiculatus</i> (a)	-	-	-	6	-	.01
F	<i>Sphaeralcea coccinea</i>	_c 83	_{bc} 60	_a 34	_{ab} 45	.34	.37
F	<i>Taraxacum officinale</i>	-	-	4	3	.01	.01
F	Unknown forb-perennial	-	-	2	-	.00	-
Total for Annual Forbs		0	0	37	60	0.09	0.17
Total for Perennial Forbs		294	355	192	165	3.94	1.47
Total for Forbs		294	355	229	225	4.03	1.64

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

BROWSE TRENDS --

Management unit 25A, Study no: 16

Type	Species	Strip Frequency		Average Cover %	
		'99	'04	'99	'04
B	Amelanchier utahensis	4	5	.38	.41
B	Artemisia nova	69	65	3.59	6.27
B	Artemisia tridentata tridentata	1	2	.15	.66
B	Artemisia tridentata vaseyana	85	79	13.40	10.92
B	Ceratoides lanata	5	8	.00	.07
B	Cercocarpus ledifolius	0	0	.00	-
B	Chrysothamnus depressus	5	10	.03	.09
B	Chrysothamnus viscidiflorus viscidiflorus	84	95	5.66	7.72
B	Echinocereus triglochidatus	0	1	.00	-
B	Gutierrezia sarothrae	53	43	.93	1.83
B	Juniperus osteosperma	0	1	-	.00
B	Opuntia spp.	15	21	.26	.42
B	Pinus edulis	2	3	-	.03
B	Purshia tridentata	8	10	2.97	3.17
B	Symphoricarpos oreophilus	4	4	.21	.00
B	Tetradymia canescens	3	4	-	.00
Total for Browse		338	351	27.61	31.63

CANOPY COVER, LINE INTERCEPT --

Management unit 25A, Study no: 16

Species	Percent Cover
	'04
Amelanchier utahensis	.63
Artemisia nova	11.01
Artemisia tridentata tridentata	1.26
Artemisia tridentata vaseyana	14.75
Chrysothamnus viscidiflorus viscidiflorus	13.63
Gutierrezia sarothrae	3.00
Opuntia spp.	.15
Pinus edulis	.06
Purshia tridentata	1.91
Symphoricarpos oreophilus	.13
Tetradymia canescens	.05

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 25A, Study no: 16

Species	Average leader growth (in)
	'04
Artemisia nova	1.0
Artemisia tridentata vaseyana	1.4

POINT-QUARTER TREE DATA --
Management unit 25A, Study no: 16

Species	Trees per Acre	
	'99	'04
Juniperus osteosperma	6	-
Pinus edulis	12	-

Average diameter (in)	
'99	'04
6.5	-
4.7	-

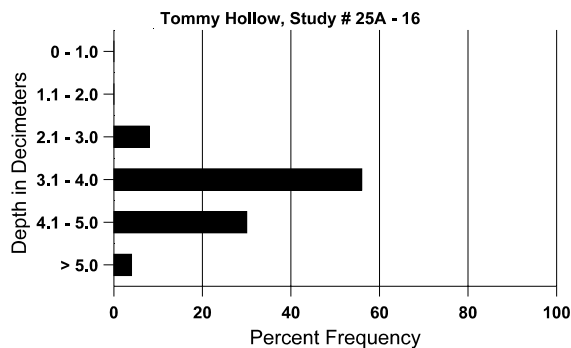
BASIC COVER --
Management unit 25A, Study no: 16

Cover Type	Average Cover %			
	'85	'91	'99	'04
Vegetation	13.50	9.75	45.80	44.76
Rock	.25	0	.04	.05
Pavement	1.50	1.75	.53	2.88
Litter	43.25	46.00	36.16	38.02
Cryptogams	0	8.50	6.69	9.32
Bare Ground	41.50	34.00	27.71	25.63

SOIL ANALYSIS DATA --
Management unit 25A, Study no: 16, Study Name: Tommy Hollow

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m
18.8	50.3 (15.0)	6.5	52.9	15.8	31.3	1.6	4.1	163.2	0.6

Stoniness Index



PELLET GROUP DATA --

Management unit 25A, Study no: 16

Type	Quadrat Frequency		Days use per acre (ha)	
	'99	'04	'99	'04
Rabbit	67	65	-	-
Elk	32	17	93 (229)	13 (33)
Deer	15	21	96 (237)	12 (30)
Cattle	3	3	9 (22)	9 (21)

BROWSE CHARACTERISTICS --

Management unit 25A, Study no: 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)
Amelanchier utahensis												
85	0	-	-	-	-	-	0	0	0	-	0	-/-
91	132	-	66	-	66	-	50	0	50	-	0	-/-
99	100	-	40	60	-	-	40	40	0	-	0	38/29
04	120	20	60	60	-	20	33	33	0	-	0	15/15
Artemisia nova												
85	10866	800	4933	5200	733	-	4	2	7	-	.61	8/11
91	9533	600	2400	1933	5200	-	37	37	55	4	13	7/10
99	7800	140	1880	5200	720	320	17	.25	9	4	4	9/16
04	6280	100	60	5140	1080	740	0	0	17	6	6	8/17
Artemisia tridentata tridentata												
85	0	-	-	-	-	-	0	0	0	-	0	-/-
91	132	-	66	-	66	-	50	50	50	-	0	-/-
99	20	-	-	-	20	-	0	0	100	-	0	-/-
04	40	-	-	-	40	100	0	0	100	50	50	69/69
Artemisia tridentata vaseyana												
85	7732	2466	3800	3466	466	-	10	2	6	-	.86	11/11
91	16532	8466	5933	2133	8466	-	36	33	51	5	18	11/18
99	6880	260	1980	3480	1420	240	31	.29	21	3	3	21/32
04	4340	180	300	2440	1600	220	29	26	37	24	24	18/28
Ceratoides lanata												
85	2733	66	400	2133	200	-	0	0	7	-	0	4/3
91	3332	133	266	2933	133	-	2	94	4	.60	2	1/2
99	220	20	-	200	20	-	27	73	9	-	0	3/3
04	360	-	20	340	-	-	50	44	0	-	6	4/3

		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)
Cercocarpus ledifolius												
85	0	-	-	-	-	-	0	0	-	-	0	-/-
91	0	-	-	-	-	-	0	0	-	-	0	-/-
99	0	20	-	-	-	-	0	0	-	-	0	-/-
04	0	-	-	-	-	-	0	0	-	-	0	34/44
Chrysothamnus depressus												
85	66	-	-	-	66	-	0	0	100	-	0	-/-
91	798	-	66	666	66	-	17	83	8	-	0	2/2
99	180	-	-	180	-	-	33	33	0	-	0	3/5
04	400	-	100	300	-	-	0	25	0	-	0	4/8
Chrysothamnus viscidiflorus viscidiflorus												
85	0	-	-	-	-	-	0	0	0	-	0	-/-
91	24732	533	6733	17333	666	-	33	23	3	.32	1	5/5
99	12580	-	400	11980	200	40	.31	0	2	-	0	4/9
04	7120	360	100	6980	40	-	0	0	1	.28	.28	5/10
Echinocereus spp.												
85	0	-	-	-	-	-	0	0	-	-	0	-/-
91	0	-	-	-	-	-	0	0	-	-	0	-/-
99	0	-	-	-	-	-	0	0	-	-	0	-/-
04	20	-	-	20	-	-	0	0	-	-	0	2/3
Gutierrezia sarothrae												
85	17933	1200	3133	14800	-	-	0	0	-	-	0	5/7
91	133	-	-	133	-	-	0	0	-	-	0	4/5
99	5780	40	820	4960	-	-	0	0	-	-	0	6/7
04	2060	-	-	2060	-	-	0	0	-	-	0	6/8
Juniperus osteosperma												
85	0	-	-	-	-	-	0	0	-	-	0	-/-
91	0	-	-	-	-	-	0	0	-	-	0	-/-
99	0	-	-	-	-	-	0	0	-	-	0	-/-
04	20	-	20	-	-	-	0	0	-	-	0	-/-
Opuntia spp.												
85	0	-	-	-	-	-	0	0	0	-	0	-/-
91	399	66	266	133	-	-	0	0	0	-	0	2/1
99	580	-	160	380	40	-	0	0	7	7	7	3/12
04	920	-	20	900	-	-	0	0	0	-	0	2/7

		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)
Pinus edulis												
85	0	-	-	-	-	-	0	0	0	-	0	-/-
91	0	-	-	-	-	-	0	0	0	-	0	-/-
99	40	20	40	-	-	-	0	0	0	-	0	-/-
04	60	-	40	-	20	-	0	0	33	-	0	-/-
Purshia tridentata												
85	199	-	66	133	-	-	33	33	0	-	0	20/23
91	266	-	-	-	266	-	0	75	100	30	100	-/-
99	180	-	40	80	60	-	33	33	33	-	0	20/48
04	280	20	20	220	40	20	0	93	14	7	7	16/44
Symphoricarpos oreophilus												
85	0	-	-	-	-	-	0	0	0	-	0	-/-
91	0	-	-	-	-	-	0	0	0	-	0	-/-
99	120	-	40	80	-	-	0	0	0	-	0	14/27
04	100	-	40	40	20	-	20	0	20	-	0	9/14
Tetradymia canescens												
85	0	-	-	-	-	-	0	0	-	-	0	-/-
91	0	-	-	-	-	-	0	0	-	-	0	-/-
99	60	-	40	20	-	-	0	33	-	-	0	12/15
04	160	-	140	20	-	-	0	0	-	-	0	3/8