

Trend Study 6-10-06

Study site name: Mahogany Hills .

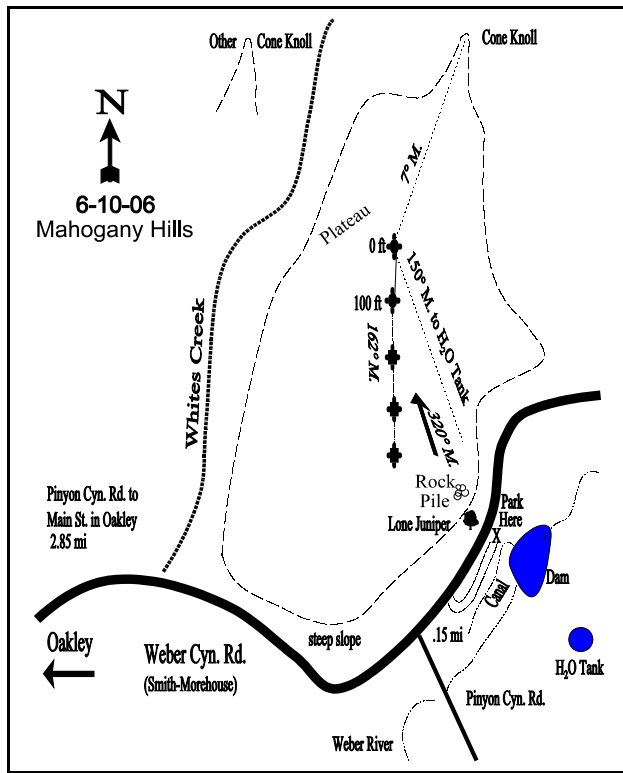
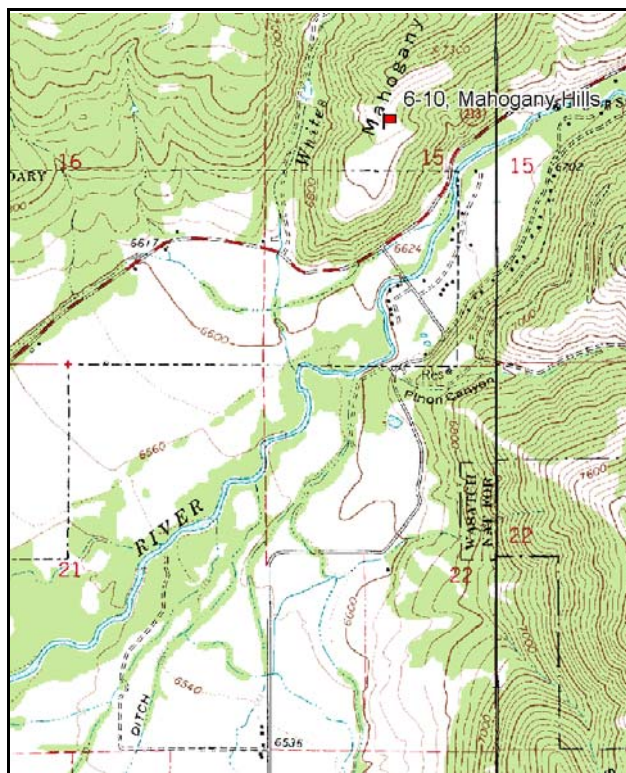
Vegetation type: Mountain brush .

Compass bearing: frequency baseline 162 degrees magnetic.

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

LOCATION DESCRIPTION

From Oakley, proceed up Weber Canyon watching for Pinyon Canyon Lane which is a right turn. From this road proceed 0.15 miles farther up Weber Canyon and park opposite a small irrigation canal dam. The main river dam to supply the canal is 100 yards upstream. From the river diversion walk up the steep slope at 273 degrees magnetic to a large lone juniper and mahogany. From the lone juniper and mahogany, a rock pile can be found 55 paces at 320 degrees magnetic. From the rock pile, the 0-foot baseline stake is approximately 80 paces at a bearing of 320 degrees magnetic. The 0-foot stake of the is marked by with browse tag #7952. To triangulate on the 0-foot stake when in the middle of plateau: from the stake to a cone-knoll to the north is 7 degree magnetic, from the stake to a water tank on the right at the mouth of Pinyon Canyon is 150 degrees magnetic.



Map Name: Kamas

Diagrammatic Sketch

Township 1S, Range 6E, Section 15

UTM NAD 27, UTM 12T 4509302 N 478425 E

DISCUSSION

Mahogany Hills - Trend Study No. 6-10

Study Information

This study was established in 1984 to sample critical big game winter range at the mouth of the Upper Weber River Canyon (elevation: 7,100 feet, slope: 12%, aspect: southeast). The vegetation type is best categorized as mountain big sagebrush-grass with many mountain brush species. Elk use has been moderate, while deer use has been light. There has been no evidence of livestock use. The pellet group transect data estimates in 2001 were 41 elk days use/acre (101 edu/ha) and 11 deer days use/acre (26 ddu/ha). The 2006 pellet group data estimates were 59 elk and 48 deer days use/acre (146 edu/ha and 119 ddu/ha). Both deer and elk pellet appeared to be from fall, winter, and spring.

Soil

The soil is in the Agassiz series which consists of very shallow and shallow, somewhat excessively drained, moderate or moderately rapidly permeable soils on mountainsides (USDA-NRCS 2006). The effective rooting depth was estimated at almost 13 inches. The soil texture is a loam with a neutral soil reaction (6.7 pH). This area has a diverse plant composition, especially among grasses. Vegetation and litter cover are excellent. No significant erosion has been noted. The erosion soil condition class assessments completed in 2001 and 2006 were stable.

Browse

Mountain big sagebrush dominates the browse component. It provided 16% cover in 1996 and 11% in 2001 and 2006. Decadence has been high for this species since 1984 (between 40-82% decadence). Sagebrush density was estimated at 4,133 plants/acre in 1984, but has steadily declined to slightly more than 1,900 plants/acre in 2001 and 2006. Lower density numbers may be due to the greatly increased sample size used starting in 1996, which better estimates browse populations. Recruitment from young plants has also been low at less than 5% in all readings, due to the high competition with smooth brome for seedling establishment. Plants classified as dying increased from 4% of the population in 1996 to 8% in 2001, to 21% in 2006. Density may continue to decline in the future with only half of the population classified as mature in 2001 and 2006, the low recruitment, and increasing numbers of dying individuals. Utilization on mountain big sagebrush has been moderate to heavy for almost all readings, and plants classified with poor vigor have averaged around 17%. Average leader growth on mountain big sagebrush was less than 2 inches in 2001 and 2006.

Other valuable browse species that contribute to the community include mountain snowberry, serviceberry, true mountain mahogany, and antelope bitterbrush. These species display moderate to heavy use, but low percent decadence and normal vigor. Annual leader growth averaged about 2.5 inches for serviceberry and mountain mahogany in 2001. In 2006, serviceberry leader growth was about 4 inches, but only 2.5 inches for mahogany. Also present are some less desirable shrubs such as stickyleaf low rabbitbrush and gray horsebrush. Stickyleaf low rabbitbrush has shown some dynamic changes in its density, but with very few young in the population, these increases are due mostly to the much larger sample size utilized in 1996, not an actual increase in the population. Gambel oak density was estimated at 460 stems/acre in 1996, 1,120 stems/acre in 2001, and 1,180 stems/acre in 2006. Since 1996, oak has been light to moderately used. A late snow storm and cold temperatures in June 2001 killed a lot of the leaf and meristematic biomass of the oak in the 2001 sampling.

Herbaceous Understory

Perennial grasses are an important component and have provided 33-36% cover since 1996, which is the majority of the herbaceous cover. Of the 15 species of grasses identified, three are seeded species that are more commonly found in meadows and pastures. Smooth brome is the most abundant grass and has increased in abundance since 1984. It provided 20% cover in 1996, 25% cover in 2001, and 24% cover in 2006. It is a shade tolerant, sod-forming species which can, in mountain brush communities, dominate and outcompete many herbaceous understory species and browse seedlings, especially sagebrush. Sandberg, Kentucky, and

mutton bluegrasses are also fairly abundant. Forbs also have a diverse composition and include several palatable and valuable species. Arrowleaf balsamroot, one-flowered helianthella, low penstemon, and redroot eriogonum are preferred forbs. Forb cover was about 6% in 1996 and 2001 and increased to 9% in 2006.

1990 TREND ASSESSMENT

The data shows the effects of drought on the mountain big sagebrush community. Compared to the wet years, when this trend study was established in 1984, there is obviously less production for sagebrush and grass in 1990. The density of sagebrush has decreased, with the density of mature sagebrush increasing due to a decline in percent decadence. The majority of the population is moderately hedged, compared to 61% that were heavily browsed in 1984. Populations of the other palatable, but less common browse were unchanged. Most are now moderately hedged. Smooth brome is thick in the understory. There is a large diversity of forbs that provide significant forage. There are also several palatable species for deer that inhabit the area year-round. Elk use appears to be moderate in the winter.

browse - down (-2)

grass - stable (0)

forb - up (+2)

1996 TREND ASSESSMENT

The browse trend is stable. Sagebrush densities have decreased slightly, but this is likely due in part to the increased sample size in 1996, which better estimates patchy communities. Part of the decline could be due to the very competitive and extremely abundant smooth brome, which is a sod-forming shade-tolerant grass. Few seedlings were encountered on all readings and there are few places for sagebrush seedlings to establish. The population is becoming more decadent and dying. The other browse species are doing much better. The grass trend is stable. The nested frequency of perennial grasses increased slightly, but this is likely due to the change in the locations of sampling belts. The forb trend is stable. The nested frequency of perennial forbs is unchanged. The Desirable Components Index score is good due to excellent browse, perennial grass, and perennial forb cover.

winter range condition (DC Index) - good (76) Mid-level potential scale

browse - stable (0)

grass - stable (0)

forb - stable (0)

2001 TREND ASSESSMENT

Sagebrush density continues to decline, and decadence is moderately high at 48%. The density of young recruited into the population is low at only 20 plant/acre. This species may continue to decline in the future without an increase in reproductive success, which is unlikely due to the high ground cover of smooth brome. The other palatable preferred browse are stable. Serviceberry, true mountain mahogany, and bitterbrush show stable densities, low decadence, and normal vigor. They also have much more extensive root structures which are more competitive in drought conditions. Trend for browse is down overall because mountain big sagebrush is the dominant browse species. The grass trend is slightly down. The nested frequency of perennial grasses, excluding bulbous bluegrass, decreased 12% due in part to a significantly decrease in the nested frequency of bluebunch wheatgrass. Cheatgrass was sampled for the first time at this location, but only in one quadrat. The forb trend is down. The nested frequency of perennial forbs decreased 21%. The DCI score remained good, although the browse cover value decreased.

winter range condition (DC Index) - good (68) Mid-level potential scale

browse - down (-2)

grass - slightly down (-1)

forb - down (-2)

2006 TREND ASSESSMENT

The browse trend is stable. Mountain big sagebrush density remained unchanged. Decadence did not change and plants with poor vigor changed little. Plants classified as dying increased to 21% of the population. The densities of other preferred browse species fluctuated some, but were stable overall. The grass trend is slightly down. The nested frequency of perennial grasses, excluding bulbous bluegrass, decreased 16%. Some of this

decline is due to significant decreases in the nested frequencies of thickspike wheatgrass and Kentucky bluegrass. The forb trend is up. The nested frequency of perennial forbs increased 49%. The DCI score remained good.

winter range condition (DC Index) - good (67) Mid-level potential scale
browse - stable (0) grass - slightly down (-1) forb - up (+2)

HERBACEOUS TRENDS --
Management unit 06 , Study no: 10

T y p e	Species	Nested Frequency					Average Cover %		
		'84	'90	'96	'01	'06	'96	'01	'06
G	Agropyron cristatum	11	7	8	5	4	.27	.03	.00
G	Agropyron dasystachyum	_b 13	_{ab} 8	_{ab} 2	_b 17	_a -	.00	.52	-
G	Agropyron spicatum	_b 97	_b 120	_b 85	_a 37	_a 23	2.52	.98	.43
G	Bromus inermis	_a 159	_b 217	_c 278	_c 293	_c 295	19.99	25.12	24.01
G	Bromus tectorum (a)	-	-	-	2	-	-	.00	-
G	Carex sp.	-	-	-	-	2	-	-	.15
G	Dactylis glomerata	1	-	5	1	-	.15	.00	-
G	Koeleria cristata	_a -	_a -	_b 33	_b 19	_c 76	.82	.83	6.19
G	Melica bulbosa	-	-	7	-	1	.01	-	.00
G	Phleum pratense	2	-	-	-	-	-	-	-
G	Poa bulbosa	_a -	_a 8	_a 9	_a 3	_b 31	.33	.06	1.14
G	Poa fendleriana	55	35	65	76	33	2.61	2.40	1.07
G	Poa pratensis	_b 80	_b 76	_b 115	_b 70	_a 34	3.40	1.42	.34
G	Poa secunda	_{ab} 129	_b 133	_{ab} 117	_a 129	_a 79	2.68	3.29	2.91
G	Stipa columbiana	_b 40	_b 25	_a -	_a -	_a -	-	-	-
G	Stipa comata	_{ab} 8	_b 12	_{ab} 22	_a 1	_a -	.58	.03	-
Total for Annual Grasses		0	0	0	2	0	0	0.00	0
Total for Perennial Grasses		595	641	746	651	578	33.41	34.70	36.30
Total for Grasses		595	641	746	653	578	33.41	34.71	36.30
F	Achillea millefolium	7	2	1	-	3	.00	-	.15
F	Agoseris glauca	-	-	-	6	5	-	.01	.01
F	Alyssum alyssoides (a)	-	-	_a 14	_{ab} 23	_b 32	.05	.27	.09
F	Allium sp.	_a -	_b 28	_a 3	_a 4	_c 65	.01	.01	.33
F	Antennaria rosea	1	-	1	-	-	.03	-	-
F	Arabis sp.	_{ab} 8	_a 1	_b 17	_a -	_{ab} 9	.04	-	.05
F	Arenaria sp.	-	4	-	-	-	-	-	-
F	Artemisia ludoviciana	-	-	3	3	3	.38	.15	.38
F	Astragalus convallarius	_a 4	_b 32	_c 61	_{bc} 53	_{bc} 34	1.10	.84	.61
F	Balsamorhiza sagittata	10	4	5	9	13	.57	.92	2.14

Type	Species	Nested Frequency					Average Cover %		
		'84	'90	'96	'01	'06	'96	'01	'06
F	<i>Castilleja linariaefolia</i>	6	3	11	2	10	.52	.12	.27
F	<i>Calochortus nuttallii</i>	a-	a ⁵	a-	a-	b ²⁷	-	-	.09
F	<i>Cirsium undulatum</i>	3	4	6	5	-	.07	.15	-
F	<i>Comandra pallida</i>	a-	ab ²	b ¹⁰	ab ²	ab ⁵	.08	.16	.56
F	<i>Collinsia parviflora</i> (a)	-	-	24	17	15	.12	.06	.06
F	<i>Cordylanthus ramosus</i> (a)	-	-	a ¹	ab ⁷	b ¹⁶	.00	.04	.34
F	<i>Crepis acuminata</i>	a-	c ⁹⁷	b ⁵⁹	b ⁵⁶	b ⁶⁸	.56	.60	1.47
F	<i>Draba sp.</i> (a)	-	-	-	-	4	-	-	.01
F	<i>Erigeron pumilus</i>	3	4	5	5	4	.04	.01	.06
F	<i>Eriogonum racemosum</i>	7	11	10	9	2	.24	.13	.01
F	<i>Eriogonum umbellatum</i>	-	-	6	5	8	.12	.06	.33
F	<i>Hackelia patens</i>	d ⁸⁸	c ³⁸	bc ²²	ab ⁴	a-	.24	.03	.00
F	<i>Helianthella uniflora</i>	a-	a-	b ²⁹	b ¹⁸	b ²⁶	1.39	1.51	1.60
F	<i>Holosteum umbellatum</i> (a)	-	-	b ¹¹	a ³	a-	.05	.00	-
F	<i>Lappula occidentalis</i> (a)	-	-	-	-	6	-	-	.01
F	<i>Lithospermum ruderale</i>	3	-	7	6	3	.21	.12	.21
F	<i>Lomatium sp.</i>	-	-	-	-	11	-	-	.07
F	<i>Microsteris gracilis</i> (a)	-	-	a-	b ¹⁵	b ¹²	-	.13	.03
F	<i>Penstemon humilis</i>	b ¹¹	b ¹³	ab ⁵	a-	a-	.06	-	-
F	<i>Phlox longifolia</i>	-	3	-	3	-	-	.00	-
F	<i>Polygonum douglasii</i> (a)	-	-	b ¹⁵	a-	b ¹³	.04	-	.04
F	<i>Ranunculus testiculatus</i> (a)	-	-	-	-	1	-	-	.00
F	<i>Schoenocrambe linifolia</i>	-	-	2	1	-	.00	.03	-
F	<i>Senecio integerrimus</i>	a-	a-	a-	b ¹⁵	b ¹⁴	-	.10	.15
F	<i>Zigadenus paniculatus</i>	-	-	3	3	2	.01	.03	.00
Total for Annual Forbs		0	0	65	65	99	0.28	0.51	0.59
Total for Perennial Forbs		151	251	266	209	312	5.73	5.02	8.51
Total for Forbs		151	251	331	274	411	6.01	5.53	9.10

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

BROWSE TRENDS --

Management unit 06 , Study no: 10

Type	Species	Strip Frequency			Average Cover %		
		'96	'01	'06	'96	'01	'06
B	Amelanchier alnifolia	24	31	24	3.34	2.84	1.99
B	Artemisia tridentata vaseyana	80	69	68	16.30	11.05	11.46
B	Cercocarpus montanus	1	3	1	1.31	.18	.15
B	Chrysothamnus depressus	4	6	7	.30	.27	.71
B	Chrysothamnus viscidiflorus viscidiflorus	39	50	41	2.55	1.41	2.56
B	Gutierrezia sarothrae	0	0	1	-	-	-
B	Purshia tridentata	9	10	11	1.49	1.10	.60
B	Quercus gambelii	7	7	6	.91	1.08	.91
B	Symphoricarpos oreophilus	54	46	51	10.48	6.54	7.14
B	Tetradymia canescens	4	5	5	.18	.18	.15
Total for Browse		222	227	215	36.89	24.68	25.70

CANOPY COVER, LINE INTERCEPT --

Management unit 06 , Study no: 10

Species	Percent Cover
	'06
Amelanchier alnifolia	3.96
Artemisia tridentata vaseyana	9.46
Chrysothamnus depressus	.10
Chrysothamnus viscidiflorus viscidiflorus	2.88
Purshia tridentata	2.00
Quercus gambelii	1.03
Symphoricarpos oreophilus	9.10
Tetradymia canescens	.30

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 06 , Study no: 10

Species	Average leader growth (in)	
	'01	'06
Amelanchier alnifolia	2.6	4.1
Artemisia tridentata vaseyana	1.8	1.7
Cercocarpus montanus	2.4	2.7
Purshia tridentata	-	3.3

BASIC COVER --

Management unit 06 , Study no: 10

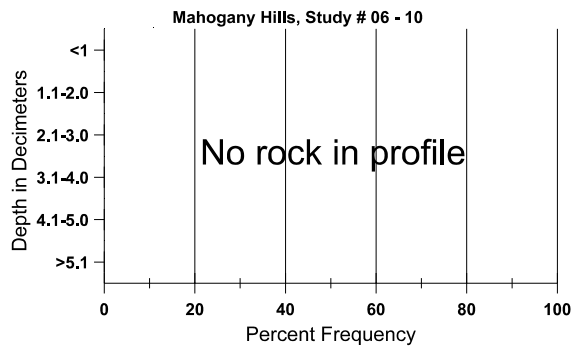
Cover Type	Average Cover %				
	'84	'90	'96	'01	'06
Vegetation	5.00	16.50	61.87	61.94	66.13
Rock	.50	0	.05	.03	.01
Pavement	.50	0	.09	.14	.07
Litter	80.50	76.00	75.13	70.69	58.55
Cryptogams	.50	.75	.74	.19	.06
Bare Ground	13.00	6.75	5.88	3.95	5.35

SOIL ANALYSIS DATA --

Herd Unit 06, Study no: 10, Mahogany Hills

Effective rooting depth (in)	Temp °F (depth)	PH	Loam			%OM	PPM P	PPM K	dS/m
			%sand	%silt	%clay				
12.7	58.4 (14.5)	6.7	38.9	35.1	26.0	3.7	32.5	195.2	0.6

Stoniness Index



PELLET GROUP DATA --

Management unit 06 , Study no: 10

Type	Quadrat Frequency		
	'96	'01	'06
Rabbit	-	-	1
Elk	22	17	14
Deer	12	3	11

Days use per acre (ha)	
'01	'06
-	-
41 (101)	59 (146)
11 (26)	48 (119)

BROWSE CHARACTERISTICS --
Management unit 06 , Study no: 10

		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 alnifolia												
84	399	-	66	-	333	-	0	100	83	-	67	-/-
90	266	-	66	-	200	-	75	25	75	-	25	-/-
96	560	-	-	380	180	-	64	25	32	-	4	33/39
01	880	-	40	700	140	-	23	34	16	-	0	33/36
06	620	-	80	500	40	20	48	35	6	-	3	36/32
Artemisia tridentata vaseyana												
84	4133	-	-	733	3400	-	34	61	82	1	27	32/41
90	3265	-	66	1733	1466	-	76	4	45	4	16	27/30
96	2780	-	100	1560	1120	720	60	32	40	4	17	28/39
01	1920	-	20	980	920	700	56	21	48	8	18	26/34
06	1960	-	80	940	940	680	43	27	48	21	21	26/33
Cercocarpus montanus												
84	0	-	-	-	-	-	0	0	0	-	0	-/-
90	132	-	66	-	66	-	0	50	50	15	50	-/-
96	20	-	-	20	-	-	0	0	0	-	0	54/63
01	60	-	20	40	-	-	0	67	0	-	0	40/37
06	40	-	-	40	-	-	0	100	0	-	0	46/59
Chrysothamnus depressus												
84	0	-	-	-	-	-	0	0	-	-	0	-/-
90	0	-	-	-	-	-	0	0	-	-	0	-/-
96	220	-	-	220	-	-	0	0	-	-	0	7/10
01	200	-	-	200	-	-	0	0	-	-	0	8/9
06	340	-	120	220	-	-	53	0	-	-	0	8/13
Chrysothamnus viscidiflorus viscidiflorus												
84	398	-	66	66	266	-	0	0	67	-	0	10/13
90	66	-	-	66	-	-	0	0	0	-	0	13/3
96	1740	-	20	1720	-	-	0	0	0	-	1	14/16
01	1680	40	20	1660	-	-	0	0	0	-	0	12/15
06	1500	-	60	1440	-	-	4	0	0	-	0	14/19

		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>Gutierrezia sarothrae</i>												
84	0	-	-	-	-	-	0	0	-	-	0	-/-
90	0	-	-	-	-	-	0	0	-	-	0	-/-
96	0	-	-	-	-	-	0	0	-	-	0	-/-
01	0	-	-	-	-	-	0	0	-	-	0	-/-
06	20	-	-	20	-	-	0	0	-	-	0	8/8
<i>Opuntia sp.</i>												
84	0	-	-	-	-	-	0	0	-	-	0	-/-
90	0	-	-	-	-	-	0	0	-	-	0	-/-
96	0	-	-	-	-	-	0	0	-	-	0	6/9
01	0	-	-	-	-	-	0	0	-	-	0	-/-
06	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Purshia tridentata</i>												
84	466	-	-	466	-	-	0	100	-	-	43	23/39
90	266	-	-	266	-	-	75	0	-	-	0	25/40
96	240	-	-	240	-	-	42	42	-	-	0	16/36
01	280	-	20	260	-	-	7	64	-	-	0	14/34
06	360	-	40	320	-	-	28	28	-	-	0	18/34
<i>Quercus gambelii</i>												
84	0	-	-	-	-	-	0	0	0	-	0	-/-
90	0	-	-	-	-	-	0	0	0	-	0	-/-
96	460	-	-	460	-	80	83	4	0	-	0	32/22
01	1120	-	100	880	140	240	68	4	13	13	70	22/18
06	1180	-	260	800	120	160	34	0	10	10	10	23/11
<i>Symphoricarpos oreophilus</i>												
84	1265	-	66	1133	66	-	5	0	5	-	0	20/30
90	1266	-	333	400	533	-	26	5	42	5	26	22/37
96	3380	100	520	2840	20	-	18	0	1	-	0	19/32
01	1860	-	60	1720	80	-	4	0	4	-	0	18/36
06	3720	60	240	3480	-	-	0	0	0	-	0	18/27
<i>Tetradymia canescens</i>												
84	0	-	-	-	-	-	0	0	-	-	0	-/-
90	0	-	-	-	-	-	0	0	-	-	0	-/-
96	80	-	-	80	-	-	25	0	-	-	0	17/18
01	100	-	-	100	-	-	0	0	-	-	0	15/22
06	100	-	-	100	-	-	40	0	-	-	0	14/18