Trend Study 14-11-04

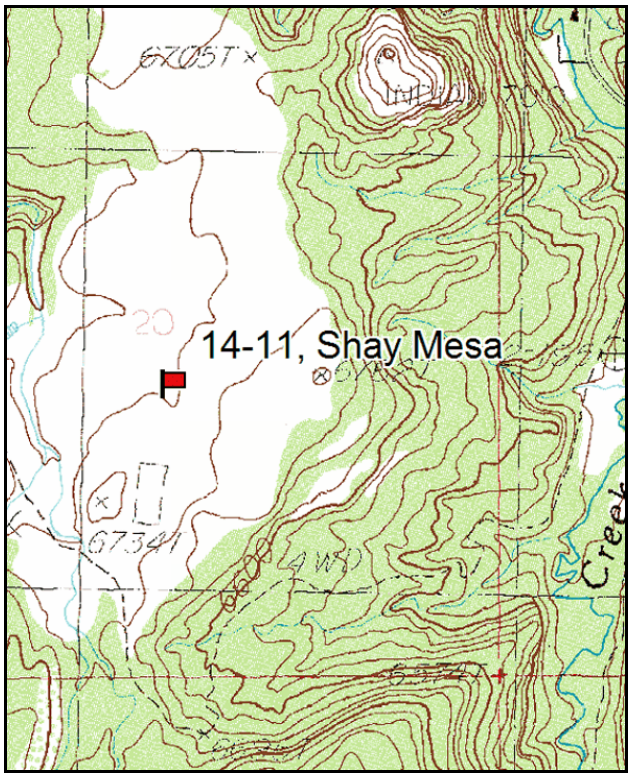
Study site name: Shay Mesa . Vegetation type: Chained, Seeded P-J .

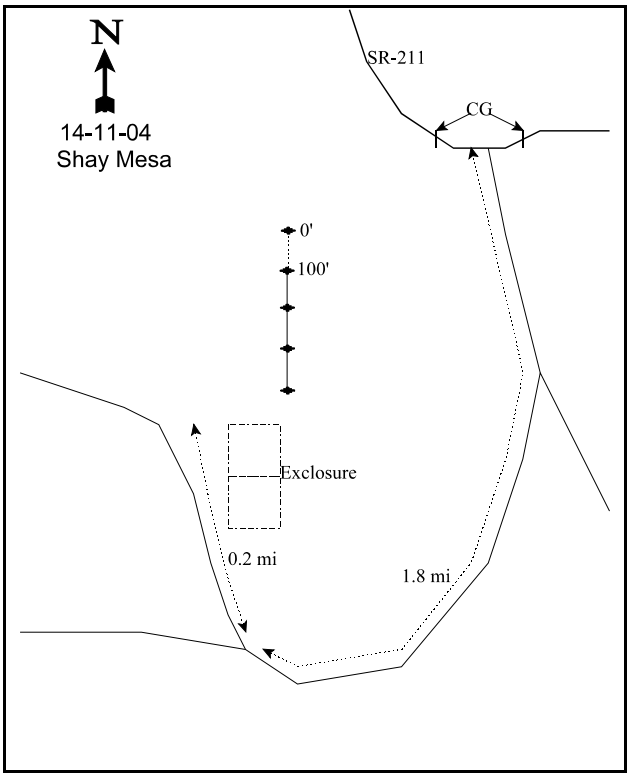
Compass bearing: frequency baseline 165 degrees magnetic.

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

LOCATION DESCRIPTION

From the junction of SR-l91 and 211 (about 14 miles north af Monticello), turn west on the road towards Canyonlands National Park and Newspaper Rock. Go approximately 13 miles on this paved road, the last two miles dropping into the canyon of a tributary to Indian Creek. Cross a cattleguard and turn left just before another cattleguard and 0.1 miles east of Newspaper Rock. Turn left on this road, cross Indian Creek and go 1.8 miles up onto the mesa. Look for a faint road going up to the right through an old pinyon-juniper chaining to an exclosure. Follow this road 0.2 miles to the north end of the exclosure. The end of the baseline is located 100 feet north of the northeast corner of the exclosure. The 0 foot end of the baseline is 400 feet north and the stake is tagged #7877.





Map Name: Shay Mountain

Diagrammatic Sketch

Township 32S , Range 22E , Section 20

GPS: NAD 27, UTM 12S 4204431 N, 629186 E

DISCUSSION

Shay Mesa - Trend Study No. 14-11

Located on Shay Mesa, this study samples a mixed pinyon-juniper woodland with openings of sagebrush and grass which is established on an old chaining. This large chaining and seeding project was done in the mid-1960's on the high mesa foothills north of the Abajo Mountains. The seed mixture included crested wheatgrass, pubescent wheatgrass, alfalfa, and a ground application of four-wing saltbush, bitterbrush, and cliffrose at selected locations. There was little evidence of the seeding on this particular study site, as all species encountered during all readings were native. The trend study was placed just outside a 1958 BLM two-way exclosure. The study site has an eastern aspect and an elevation of about 6,700 feet, 700 feet above Indian Creek, which is a perennial stream. Shay Mesa is grazed by 200-300 cattle in fall or spring. Judging by sign and use on grasses in 1986, cattle use was moderate to heavy that year. Pellet group data from mid-June of 1999 estimated 26 cow use days/acre (64 cdu/ha). Nearly all of the pats sampled appeared to be from the last season. Only 1 deer day use/acre (2 ddu/ha) was estimated. Rabbit pellets were very numerous. Pellet group data from 2004 showed light cattle use at 8 days use/acre (20cdu/ha). Only 2 deer days use/acre was estimated but elk had utilized the site during the winter and early spring at an estimated 13 days use/acre (31 edu/ha).

Exposed bare soil is moderately abundant and in places dominated by pinyon, there is much less plant cover and consequently a higher amount of exposed soil. This condition leads to a substantial amount of soil loss from these areas. The light red, fine-textured sandy clay loam soil has an effective rooting depth estimated at about 16 inches. It is quite susceptible to erosion. The soil has a neutral pH (7.3), low organic matter content and phosphorus. There is one large gully about 20 yards northeast of the baseline which was active in 1986, but appeared to be healing as of 1999. There were also many erosion channels and signs of sheet erosion found throughout the pinyon-juniper understory in 1986. There is still some signs of localized erosion, however it is not severe due to the gentle slope (about 2-5%). An erosion condition class assessment rated erosion as slight in 2004.

The dominant overstory is pinyon with a few juniper. Pinyon and juniper provide good cover for wildlife but suppress understory grasses, forbs and shrubs. Point-center quarter data from 2004 estimated 34 juniper and 79 pinyon trees/acre. Average diameter of juniper was estimated at 8.5 inches, while pinyon was estimated at just over 5 inches. About 50% of the juniper and 61% of the pinyon trees were greater than 12 feet in height.

The key browse species is mountain big sagebrush which remained at a stable density between 1986 and 1999 at an estimated population of about 2,200 plants/acre. The stand has become increasingly mature through time. In 1986 only 21% of the population was mature and in 1999, 85% were classified as mature. Few decadent plants were sampled on the site between 1986 and 1999, but in 2004, about a third of the population was classified as decadent. General browsing use on the sagebrush has been moderate with some classified as heavy. Annual leader growth was excellent in 2004, averaging just over 4 inches.

There were some white-stemmed rubber rabbitbrush sampled in 1986, but none were encountered in 1994, 1999, or 2004. These rabbitbrush were apparently highly palatable and were heavily hedged during the 1986 reading. Other palatable browse species in the area include four-wing saltbush (warm season species), slender buckwheat, and winterfat (warm season species). Broom snakeweed, a small increaser subshrub, is also common.

Grasses are fairly abundant although they show the effects of grazing, especially when compared to the wildlife exclosure. Nested frequency for perennial grasses has declined considerable since 1986. Cheatgrass an annual, increased significantly in frequency between 1994 and 1999. It provided 39% of the total grass cover in 1999, but declined considerably in 2004 due to drought conditions. The most abundant perennial grasses include blue grama and needle-and-thread. Several typical pinyon-juniper associated forb species are present, although overall density and usefulness is limited. The cover value for all the forbs combined was only a little over 1% in 1994 and 2004. The most common perennial species is scarlet globemallow.

1986 APPARENT TREND ASSESSMENT

Currently there appears to be a good balance between sagebrush and grass on the majority of the area. It is interesting to note the apparent contrasts presented by the exclosure in terms of plant composition and the effects of grazing and browsing. Sometimes it is difficult to determine a vegetative trend based on only one key species, mountain big sagebrush. There are signs to indicate it was once more abundant, but there are also a good number of young plants. The lack of seedlings could easily be attributed to unfavorable conditions the last few years and with current seed production, it could change anytime. The one definite downward indicator is the increasing number and size of pinyon, although this invasion is occurring slowly. Overall vegetative trend is stable if current management practices are followed and deer numbers don't increase substantially on the winter range. An increase in grazing pressure could be detrimental to the sagebrush, but the fall and/or spring use by livestock can even be more detrimental, especially during a prolonged drought. The soil trend is related directly to the amount of ground cover and trends in that area also appear stable.

1994 TREND ASSESSMENT

The soil trend is down at this time because of the loss of almost half of the litter cover and percent bare ground has risen from 21% to 40%. The browse trend would be considered stable for most measured characteristics. Mountain big sagebrush is stable except for the increase in individuals that are considered to have poor vigor, which has risen to 17%. For the herbaceous understory, the perennial grasses have experienced a sharp decrease in their nested frequency values. Perennial forbs are fairly stable, but even when all are combined, they contribute only about 1½% cover. Trend for the herbaceous understory is down. The Desirable Components Index (see methods) rating is poor at 44 due mostly to a lack of preferred browse cover. Forbs are also lacking.

TREND ASSESSMENT
soil - down (1)
browse - stable (3)
herbaceous understory - down (1)
winter range condition (DC Index) - 44 (poor) Mountain big sagebrush/chaining type

1999 TREND ASSESSMENT

Trend for soil appears stable due to similar relative percent ground cover characteristics compared to 1994. Trend for browse appears stable for now, but the lack of reproduction and young recruitment for the key species, mountain big sagebrush, is currently low. Utilization is higher than 1994, however vigor has improved and percent decadency is relatively low. The small scattered population of fourwing saltbush appears to be about gone. It's density has declined from 200 plants/acre in 1986, to 120 in 1994, and only 40 in 1999. Utilization is heavy and vigor poor. Trend for the herbaceous understory is fairly stable for perennial species. However cheatgrass, an annual, has increased significantly in nested frequency since 1994. Cover has also increased five-fold. The DCI score decreased slightly due to a lower proportion of young sagebrush plants and an increase in the amount of cheatgrass. Preferred browse cover was higher.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)
winter range condition (DC Index) - 41 (poor) Mountain big sagebrush/chaining type

2004 TREND ASSESSMENT

Trend for soil is down due to a 30% increase in percent cover of bare ground and a 27% decline in litter cover. Vegetation cover also declined 18% and herbaceous cover declined 46% since 1999. These trends have been

caused by the extremely dry conditions of the past few years. Spring precipitation (April - June) was only 14% of normal in 2002 and 30% of normal in 2003. Some erosion is occurring but it is not severe due to the level terrain. Trend for the key browse species, mountain big sagebrush, is down slightly. The population has increased 30% since 1999 and become more mature. However, now 27% of the stand is classified as decadent and about 18% of the population were classified as dying. Utilization is moderate to heavy but average vigor is good and annual leader growth was excellent, averaging over 4 inches. No seedlings were sampled and young plants currently account for 4% of the total population. It appears that the population will decline slightly in the future. A return to normal precipitation patterns will help reverse this trend. Trend for the herbaceous understory is also down slightly due to a decline in the sum of nested frequency of perennial grasses and forbs. The dominant perennial grass, blue grama, declined slightly in nested frequency and remained stable in percent cover. Other common perennial grasses, western wheatgrass and needle-and-thread, declined significantly in nested frequency. Cheatgrass, an annual, had a cover value of over 5% in 1999 and had a quadrat frequency of 71%. Drought conditions for the past few years during the fall and spring periods have caused a dramatic decline. Quadrat frequency of cheatgrass dropped from 71% to 1% and cover fell from over 5% to less than one-tenth of 1%. The decline in cool season annual and perennial grasses combined with the stable trend in the warm season blue grama is consistent with the precipitation trends of dry spring periods with more normal summer precipitation. Forbs remain fairly diverse but are not abundant. The only common perennial species remains scarlet globemallow. The nearby livestock exclosure appears to contain more cheatgrass than outside the exclosure. The sagebrush in the livestock exclosure shows little use. The total exclosure appears to have a higher density and canopy cover of sagebrush. Seedheads are more abundant but annual leader growth is less than outside. The DCI has remained stable. Percent decadence and proportion of young sagebrush in the population worsened, although cheatgrass was not as abundant.

TREND ASSESSMENT
soil - down (1)
browse - down slightly (2)
herbaceous understory - down slightly (2)
winter range condition (DC Index) - 40 (poor) Mountain big sagebrush/chaining type

HERBACEOUS TRENDS --
Management unit 14 , Study no: 11

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'99	'04	'94	'99	'04
G	Agropyron smithii	$_{c}$204	$_{b}$69	$_{b}$72	$_{a}$38	.42	.46	.21
G	Bouteloua gracilis	168	154	163	150	3.05	5.13	5.67
G	Bromus tectorum (a)	-	$_{b}$49	$_{c}$222	$_{a}$2	.18	5.43	.03
G	Oryzopsis hymenoides	-	4	10	3	.03	.02	.03
G	Poa fendleriana	1	1	-	-	.00	-	-
G	Sitanion hystrix	2	12	19	12	.03	.09	.16
G	Sporobolus cryptandrus	$_{b}$53	$_{a}$3	$_{a}$7	$_{a}$9	.00	.01	.07
G	Stipa comata	$_{d}$280	$_{c}$178	$_{b}$117	$_{a}$60	3.65	2.50	1.19
G	Vulpia octoflora (a)	-	$_{b}$121	$_{a}$39	$_{a}$12	.40	.17	.03
Total for Annual Grasses		0	170	261	14	0.58	5.60	0.06
Total for Perennial Grasses		708	421	388	272	7.20	8.24	7.35
Total for Grasses		708	591	649	286	7.79	13.85	7.41

Type	Species	Nested Frequency				Average Cover %		
		'86	'94	'99	'04	'94	'99	'04
F	Astragalus mollissimus	$_{ab}$11	$_{b}$15	$_{a}$1	$_{a}$-	.09	.03	-
F	Calochortus nuttallii	2	-	4	-	-	.03	-
F	Chaenactis douglasii	-	3	-	-	.01	-	-
F	Descurainia pinnata (a)	-	16	16	6	.04	.04	.01
F	Draba spp. (a)	-	$_{b}$65	$_{a}$-	$_{a}$-	.14	-	-
F	Eriogonum cernuum (a)	3	5	4	-	.01	.01	-
F	Erigeron pumilus	$_{b}$44	$_{a}$-	$_{a}$9	$_{a}$-	-	.02	-
F	Gilia spp. (a)	-	4	-	4	.01	-	.01
F	Holosteum umbellatum (a)	-	3	1	-	.01	.00	-
F	Lappula occidentalis (a)	-	$_{b}$18	$_{a}$4	$_{a}$4	.05	.01	.15
F	Penstemon spp.	-	3	3	-	.03	.00	-
F	Phlox hoodii	-	19	22	16	.26	.27	.06
F	Phlox longifolia	-	8	16	10	.02	.06	.09
F	Plantago patagonica (a)	-	$_{ab}$99	$_{a}$74	$_{b}$100	.25	.24	.31
F	Ranunculus testiculatus (a)	-	$_{b}$16	$_{c}$36	$_{a}$-	.03	.14	-
F	Senecio multilobatus	3	-	1	-	-	.03	-
F	Sphaeralcea coccinea	$_{ab}$118	$_{ab}$126	$_{b}$139	$_{a}$98	.60	1.16	.56
F	Tragopogon dubius	-	1	-	-	.00	-	-
Total for Annual Forbs		3	226	135	114	0.56	0.45	0.48
Total for Perennial Forbs		178	175	195	124	1.03	1.62	0.71
Total for Forbs		181	401	330	238	1.59	2.07	1.20

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

BROWSE TRENDS --
Management unit 14 , Study no: 11

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Artemisia tridentata vaseyana	44	40	56	3.49	5.55	10.04
B	Atriplex canescens	3	2	2	.03	.03	.30
B	Ceratoides lanata	0	1	1	-	-	-
B	Chrysothamnus nauseosus	0	0	4	-	-	-
B	Echinocereus spp.	0	5	2	.00	.01	.01
B	Eriogonum microthecum	14	18	19	.12	.15	.10
B	Gutierrezia sarothrae	18	62	19	.11	1.12	.03
B	Juniperus osteosperma	-	-	-	.76	1.88	-
B	Leptodactylon pungens	0	1	0	-	-	-
B	Opuntia spp.	21	26	30	.16	.55	.41
B	Pediocactus simpsonii	0	0	1	-	-	-
B	Pinus edulis	0	8	3	9.51	9.40	9.44
B	Yucca spp.	-	-	-	-	.03	-
Total for Browse		100	163	137	14.20	18.76	20.34

CANOPY COVER, LINE INTERCEPT --
Management unit 14 , Study no: 11

Species	Percent Cover	
	'99	'04
Artemisia tridentata vaseyana	-	13.81
Eriogonum microthecum	-	.05
Gutierrezia sarothrae	-	.08
Juniperus osteosperma	3.59	-
Opuntia spp.	-	3.56
Pinus edulis	12.80	12.93

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 14 , Study no: 11

Species	Average leader growth (in)
	'04
Artemisia tridentata vaseyana	1.6

POINT-QUARTER TREE DATA --
Management unit 14 , Study no: 11

Species	Trees per Acre	
	'99	'04
Juniperus osteosperma	30	34
Pinus edulis	86	79

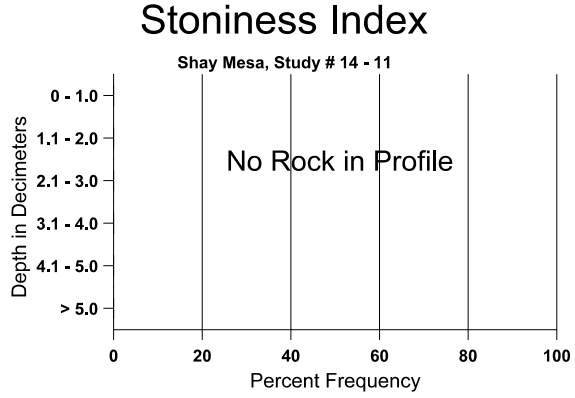
Average diameter (in)	
'99	'04
5.4	8.5
4.8	5.1

BASIC COVER --
Management unit 14 , Study no: 11

Cover Type	Average Cover %			
	'86	'94	'99	'04
Vegetation	14.00	23.29	33.92	27.69
Rock	0	.01	0	0
Pavement	0	.01	.00	.01
Litter	61.25	36.06	40.02	29.13
Cryptogams	4.25	1.69	5.40	3.53
Bare Ground	20.50	39.61	41.13	59.37

SOIL ANALYSIS DATA --
Management unit 14, Study no: 11, Study Name: Shay Mesa

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
15.8	69.3 (13.5)	7.3	58.9	18.6	22.6	1.5	7.9	83.2	0.6



PELLET GROUP DATA --
Management unit 14 , Study no: 11

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	62	60	56
Elk	-	-	20
Deer	9	3	1
Cattle	3	11	3

Days use per acre (ha)	
'99	'04
-	-
-	13 (31)
1 (2)	2 (5)
26 (64)	8 (20)

BROWSE CHARACTERISTICS --
Management unit 14 , Study no: 11

		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)
Artemisia tridentata vaseyana												
86	**2265**	-	1733	466	66	-	76	9	3	-	6	23/25
94	**2100**	20	420	1600	80	180	0	0	4	-	18	18/22
99	**2060**	20	160	1780	120	220	49	17	6	-	.97	22/30
04	**2960**	-	120	2040	800	600	52	16	27	18	18	16/25
Atriplex canescens												
86	**200**	-	-	200	-	-	67	33	0	-	0	5/3
94	**120**	20	60	20	40	-	0	0	33	33	33	20/30
99	**40**	-	-	20	20	20	0	50	50	50	50	23/21
04	**40**	-	-	40	-	-	0	0	0	-	0	16/19
Ceratoides lanata												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	11/11
99	**20**	-	-	20	-	-	0	100	-	-	0	11/12
04	**20**	-	-	20	-	-	0	100	-	-	0	12/14
Chrysothamnus nauseosus												
86	**3199**	-	733	2466	-	-	4	96	-	-	0	15/16
94	**0**	-	-	-	-	-	0	0	-	-	0	9/39
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**80**	-	-	80	-	-	0	0	-	-	0	-/-
Echinocereus spp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**100**	-	60	40	-	-	0	0	-	-	0	3/6
04	**80**	-	80	-	-	-	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)
Ephedra viridis												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	26/28
99	**0**	-	-	-	-	-	0	0	-	-	0	20/30
04	**0**	-	-	-	-	-	0	0	-	-	0	15/24
Eriogonum microthecum												
86	**533**	-	200	333	-	-	0	0	0	-	0	11/6
94	**560**	60	260	240	60	40	0	0	11	-	0	3/4
99	**1020**	40	240	740	40	-	18	51	4	-	0	6/5
04	**620**	-	20	600	-	-	0	0	0	-	0	4/3
Gutierrezia sarothrae												
86	**8266**	-	1400	6600	266	-	0	0	3	-	0	7/5
94	**640**	-	120	460	60	-	0	0	9	-	0	6/6
99	**4120**	60	600	3440	80	80	0	0	2	.97	.97	7/7
04	**700**	40	20	680	-	-	0	0	0	-	0	6/7
Leptodactylon pungens												
86	**999**	-	-	933	66	-	0	0	7	-	0	1/3
94	**0**	-	-	-	-	-	0	0	0	-	0	-/-
99	**20**	-	-	20	-	-	0	0	0	-	0	-/-
04	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Opuntia spp.												
86	**266**	-	66	200	-	-	0	0	0	-	0	3/4
94	**580**	-	60	380	140	-	0	0	24	-	3	3/11
99	**760**	60	140	600	20	60	0	0	3	-	0	6/13
04	**1240**	-	20	1180	40	-	0	0	3	3	3	5/14
Pediocactus simpsonii												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**40**	-	-	40	-	-	0	0	-	-	0	2/2
Pinus edulis												
86	**199**	-	66	133	-	-	0	0	-	-	0	114/45
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**160**	20	40	120	-	-	0	0	-	-	0	-/-
04	**60**	-	-	60	-	-	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)
Symphoricarpos oreophilus												
86	**200**	-	-	200	-	-	67	33	-	-	33	15/22
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Yucca spp.												
86	**0**	-	-	-	-	-	0	0	-	-	0	-/-
94	**0**	-	-	-	-	-	0	0	-	-	0	33/38
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-