Trend Study 21A-11-97

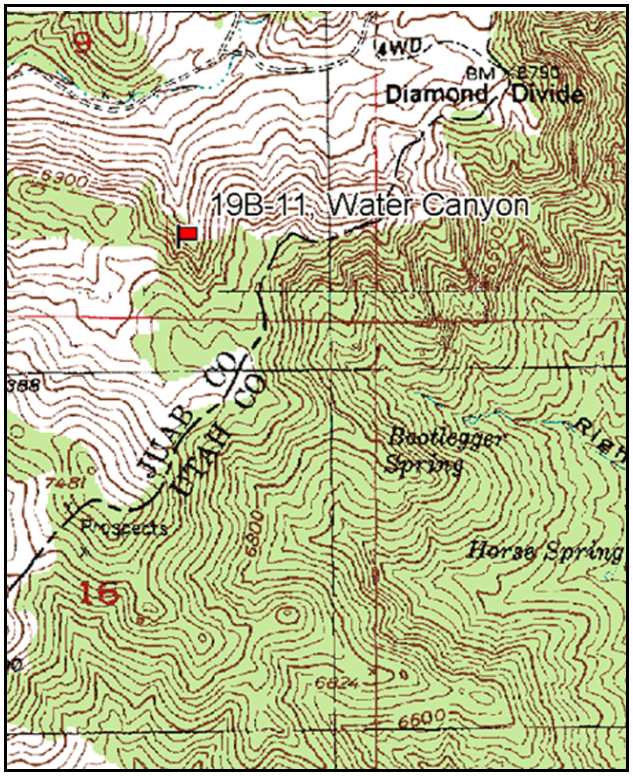
Study site name: Water Canyon . Vegetation type: Big Sagebrush-Grass .

Compass bearing: frequency baseline 205 degrees magnetic.

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

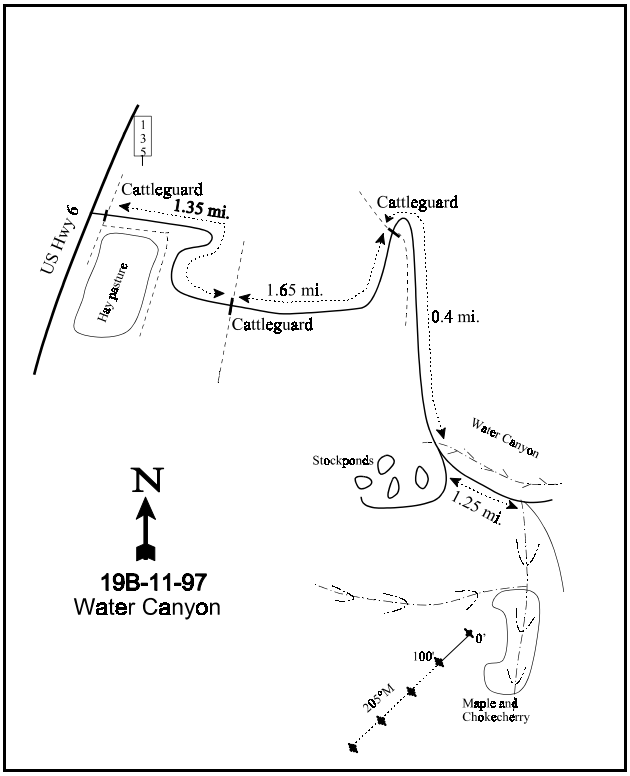
LOCATION DESCRIPTION

From the junction of the Diamond Gulch and Water Canyon Roads, travel east up Water Canyon for 1.25 miles to a point where a 4-wheel drive road takes off to the right (south) up a steep hill. This is just below (west of) where the road crosses to the north side of the creek. Walk up the canyon or drainage to the south, to the point where another small drainage intersects from the west, and a number of clumps of maple and chokecherry begin. Continue walking south up the main drainage to a point midway between the first and second side drainages encountered. Turn right (west) and walk uphill a short distance to where the 0-foot mark of the frequency baseline is located 5 to 10 feet above the clumps of maple and chokecherry. All markers are steel fenceposts 15 to 20 inches in height.



Map Name: Eureka

Township 11S , Range 2W , Section 9



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4414337 N 408588 E

DISCUSSION

Water Canyon - Trend Study No. 19B-11

***SUSPENDED - This site was suspended in 2002. The narrative and data tables from the 1997 report are included below.

The Water Canyon study is located on deer summer range at an elevation of 6,900 feet. The site is a on steep (55%), northeast facing slope occupied by mountain big sagebrush-grass. Numerous clumps of bigtooth maple, which provide shade and resting cover, are scattered throughout the area. Deer and sheep use appears moderate to light. During years with mild winters, this area is probably available year around. Use currently is considered light for deer and sheep. Because the site is near the bottom of the draw next to a spring, utilization estimates will be relatively higher than what the surrounding area actually receives.

The soil is moderately deep and well developed with good organic content (5.6%) and little surface rock or pavement. Soil textural analysis indicates a sandy clay loam with a slightly acidic pH (6.1). The effective rooting depth is 16 inches with a soil temperature of 57°F measured at 17 inches. Erosion is prevalent on the animal trails that zig-zag through the area. There are also bare shrub interspaces that show signs of erosion. There is some noticeable terracing by sheep trails and the plants appear pedestalled for the first part of the study.

The key browse species is mountain big sagebrush with an estimated density of 3,060 plants/acre in 1997. This is a healthy population with an extremely high biotic potential (2,480 seedling plants/acre) this season. The percentage of plants classified in poor vigor has steadily increased over all years to the current estimate of 13%. Utilization is mostly light. Stickyleaf low rabbitbrush has a mature age structure with an estimated density of 3,260 plants/acre in 1997. Mountain snowberry is also scattered throughout the site with an estimated density of 1,280 plants/acre. Both stickyleaf low rabbitbrush and mountain snowberry show light utilization this season. Point-center quarter data from the first and second baseline stakes indicates 840 bigtooth maple trees/acre and 21 juniper trees/acre. Other browse species encountered include slenderbush eriogonum, Oregon grape, Wood's rose, and mountain lover.

Perennial grass sum of nested frequency has declined since 1989. Several individual species have significantly decreased, including bluebunch wheatgrass and slender wheatgrass. Nelson's needlegrass is the most abundant perennial grass with a sum of nested frequency similar to that reported in 1989. Other perennial grasses include Kentucky bluegrass, Sandberg bluegrass, and bottlebrush squirreltail. Cheatgrass is present in 45% of the quadrats and constitutes 44% of the grass cover. Another annual grass, jointed goatgrass, is also present but in low abundance.

The forbs continue to be the most productive part of the understory, but also the most indicative of grazing pressure. One of the most common species, houndstongue, is a biennial most frequently found in waste places and on severely over-grazed pastures. Other invaders and/or increasers include silvery lupine, timber poisonvetch, prickly lettuce, yellow salsify, and thistle. Perennial forb sum of nested frequency has declined since 1989 from 673 to 576.

1983 APPARENT TREND ASSESSMENT

The soil trend appears stable, although soil condition is highly variable across the site. The number of barren and eroded shrub interspaces indicates that erosion could quickly become a problem. The browse species show signs of decline. Shrub populations, especially mountain big sagebrush, are dense and may be somewhat over-aged (76% are mature). Understory production is deficient and composition is indicative of excessive livestock use. Because the area is deer summer range, the lack of desirable forbs is especially disturbing.

1989 TREND ASSESSMENT

The soil trend is stable. There is a high potential for serious erosion and gullying on the steep slope, especially due to excessive trailing. The browse trend is slightly downward. Stickyleaf low rabbitbrush density has increased while the percent of decadent plants in the mountain big sagebrush population has increased. On this limited summer range area, the increase in abundance and diversity of herbaceous plants is an encouraging sign. The herbaceous understory trend is upward.

TREND ASSESSMENT
soil - stable (3)
browse - slightly down (2)
herbaceous understory - up (5)

1997 TREND ASSESSMENT

Some soil erosion continues to occur on this site, mostly on the game/sheep trails and in the barren shrub interspaces. The soil trend is stable. The mountain big sagebrush population appears to be healthy with great biotic potential this season. An increase in shrub density should not be encouraged on this site. Canopy cover for mountain big sagebrush is currently estimated to be 19%, which will be limiting the production of the herbaceous understory. The browse trend is stable at this time, but the mountain big sagebrush density will be an indicator for herbaceous understory success. The herbaceous understory trend is downward. Perennial herbaceous understory sum of nested frequency has declined since 1989. Many of the plants are increasers or invaders and are indicative of the grazing pressures exerted on the site.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - down (1)

HERBACEOUS TRENDS --
Herd unit 19B, Study no: 11

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'83	'89	'97	'83	'89	'97	'97
G	Aegilops cylindrica (a)	-	-	4	-	-	1	.15
G	Agropyron spicatum	$_{b}$153	$_{a}$27	$_{a}$26	64	11	12	.28
G	Agropyron trachycaulum	$_{a}$-	$_{c}$132	$_{b}$32	-	58	14	.22
G	Bromus marginatus	$_{b}$8	$_{a}$1	$_{a}$1	3	1	1	.03
G	Bromus tectorum (a)	-	-	127	-	-	45	1.91
G	Melica bulbosa	$_{a}$-	$_{b}$12	$_{a}$-	-	6	-	-
G	Poa fendleriana	-	4	-	-	3	-	-
G	Poa pratensis	$_{b}$81	$_{a}$15	$_{a}$26	37	7	11	.16
G	Poa secunda	$_{a}$1	$_{b}$19	$_{ab}$6	1	7	4	.04
G	Sitanion hystrix	$_{a}$-	$_{a}$-	$_{b}$10	-	-	6	.22
G	Stipa columbiana	$_{a}$-	$_{b}$103	$_{b}$89	-	39	38	1.33
Total for Annual Grasses		0	0	131	0	0	46	2.06
Total for Perennial Grasses		243	313	190	105	132	86	2.29
Total for Grasses		243	313	321	105	132	132	4.35

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %
		'83	'89	'97	'83	'89	'97	'97
F	Agoseris glauca	3	-	-	1	-	-	-
F	Allium spp.	$_{a}$-	$_{a}$-	$_{b}$10	-	-	5	.07
F	Arabis spp.	1	-	-	1	-	-	-
F	Artemisia dracunculus	-	-	3	-	-	1	.03
F	Arenaria macradenia	-	7	3	-	2	1	.00
F	Astragalus convallarius	$_{a}$-	$_{b}$14	$_{ab}$6	-	6	2	.01
F	Aster spp.	14	3	11	6	2	4	.07
F	Astragalus spp.	-	9	3	-	3	1	.00
F	Chenopodium fremontii (a)	-	-	80	-	-	39	.98
F	Cirsium spp.	-	-	2	-	-	1	.00
F	Collomia linearis (a)	-	-	18	-	-	12	.06
F	Collinsia parviflora (a)	-	-	106	-	-	37	.50
F	Crepis acuminata	-	-	4	-	-	2	.01
F	Cryptantha spp.	-	-	22	-	-	11	.05
F	Cynoglossum officinale	$_{c}$285	$_{b}$223	$_{a}$130	93	87	52	6.24
F	Epilobium brachycarpum (a)	-	-	16	-	-	7	.03
F	Erigeron spp.	a-	$_{b}$11	$_{b}$8	-	5	6	.03
F	Eriogonum racemosum	3	2	2	1	1	1	.00
F	Galium boreale	-	-	10	-	-	3	.42
F	Gayophytum ramosissimum (a)	-	-	14	-	-	5	.36
F	Heuchera parvifolia	-	1	-	-	1	-	-
F	Lactuca serriola	2	7	9	1	3	5	.05
F	Lupinus argenteus	$_{a}$37	$_{b}$143	$_{b}$135	19	65	61	6.00
F	Machaeranthera canescens	-	7	-	-	3	-	-
F	Microsteris gracilis (a)	-	-	14	-	-	5	.02
F	Phlox longifolia	$_{a}$18	$_{b}$45	$_{b}$44	9	22	22	.16
F	Polygonum douglasii (a)	-	-	41	-	-	19	.12
F	Senecio integerrimus	$_{a}$-	$_{c}$137	$_{b}$32	-	61	17	.29
F	Taraxacum officinale	-	60	46	-	31	22	.68
F	Tragopogon dubius	3	-	1	1	-	1	.03
F	Verbascum thapsus	$_{a}$-	$_{a}$1	$_{b}$10	-	1	6	.58
F	Vicia americana	-	-	4	-	-	2	.03
F	Viola spp.	-	3	1	-	1	1	.00
Total for Annual Forbs		0	0	289	0	0	124	2.09
Total for Perennial Forbs		366	673	496	132	294	227	14.79
Total for Forbs		366	673	785	132	294	351	16.89

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

BROWSE TRENDS --
Herd unit 19B, Study no: 11

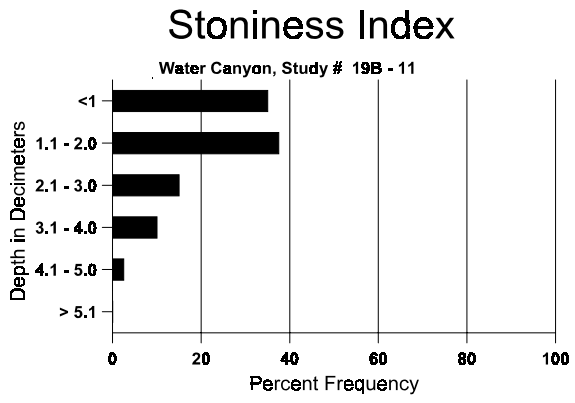
Type	Species	Strip Frequency '97	Average Cover % '97
B	Acer grandidentatum	34	7.49
B	Artemisia tridentata vaseyana	79	19.25
B	Chrysothamnus viscidiflorus viscidiflorus	65	2.65
B	Eriogonum microthecum	1	.00
B	Juniperus osteosperma	1	-
B	Mahonia repens	6	.51
B	Pachistima myrsinites	12	.00
B	Rosa woodsii	5	.15
B	Symphoricarpos oreophilus	40	1.03
Total for Browse		243	31.11

BASIC COVER --
Herd unit 19B, Study no: 11

Cover Type	Nested Frequency '97	Average Cover % '83	'89	'97
Vegetation	324	0	8.50	44.70
Rock	118	2.25	3.50	3.29
Pavement	194	.50	0	2.63
Litter	390	67.75	59.00	50.59
Cryptogams	-	0	0	0
Bare Ground	277	29.50	29.00	23.88

SOIL ANALYSIS DATA --
Herd Unit 19B, Study no: 11, Water Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
16.1	56.8 (16.7)	6.1	52.7	20.7	26.6	5.6	29.0	307.2	0.6



PELLET GROUP FREQUENCY --
Herd unit 19B, Study no: 11

Type	Quadrat Frequency '97
Sheep	13
Rabbit	5
Elk	1
Deer	10

BROWSE CHARACTERISTICS --
Herd unit 19B, Study no: 11

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Acer grandidentatum																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	5	6	-	7	-	-	-	-	-	18	-	-	-	1200			18
	97	33	2	-	3	-	-	6	-	-	44	-	-	-	880			44
M	83	1	1	-	-	-	-	-	-	-	2	-	-	-	133	35	41	2
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	25	-	-	5	-	-	6	-	-	36	-	-	-	720	55	50	36
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	50%	00%	00%	
'89	37%	00%	00%	+89%
'97	03%	00%	00%	+21%

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	133	Dec:	0%
	'89	1266		5%
	'97	1600		0%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata vaseyana																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	109	-	-	12	-	-	3	-	-	124	-	-	-	2480			124
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	97	17	2	-	-	-	-	-	-	-	17	2	-	-	380			19
M	83	24	2	-	-	-	-	-	-	-	26	-	-	-	1733	26	32	26
	89	10	5	-	-	-	-	-	-	-	14	1	-	-	1000	33	36	15
	97	87	4	-	6	-	-	-	-	-	93	-	4	-	1940	30	39	97
D	83	4	4	-	-	-	-	-	-	-	8	-	-	-	533			8
	89	7	6	-	2	-	-	-	-	-	13	-	-	2	1000			15
	97	19	6	-	1	2	-	-	-	-	11	1	4	12	740			37
X	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	800			40

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	18%	00%	00%	- 9%
'89	35%	00%	06%	+32%
'97	09%	00%	13%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	2266	Dec:	24%
	'89	2066		48%
	'97	3060		24%

Chrysothamnus viscidiflorus viscidiflorus																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	97	4	-	-	1	-	-	-	-	-	5	-	-	-	100			5
Y	83	9	-	-	-	-	-	-	-	-	9	-	-	-	600			9
	89	59	11	-	1	-	-	3	-	-	73	1	-	-	4933			74
	97	22	-	-	9	-	-	-	-	-	31	-	-	-	620			31
M	83	52	-	5	-	-	-	-	-	-	57	-	-	-	3800	11	12	57
	89	3	2	-	2	1	-	-	-	-	8	-	-	-	533	11	10	8
	97	104	8	-	13	-	-	5	-	-	130	-	-	-	2600	10	10	130
D	83	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	89	9	19	-	-	-	-	-	-	-	26	2	-	-	1866			28
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	07%	00%	+38%
'89	30%	00%	00%	-56%
'97	05%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	4533	Dec:	3%
	'89	7332		25%
	'97	3260		1%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Eriogonum microthecum																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	1	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	
'89	00%	00%	00%	
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'83	0	Dec:		-
'89	0			-
'97	20			-

Juniperus osteosperma																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	1	-	-	-	-	-	1	-	-	-	66			1
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	
'89	00%	00%	00%	-70%
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'83	0	Dec:		-
'89	66			-
'97	20			-

Mahonia repens																		
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	65	-	-	7	-	-	3	-	-	75	-	-	-	1500	4	5	75

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	
'89	00%	00%	00%	
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'83	0	Dec:		-
'89	0			-
'97	1500			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Pachistima myrsinites																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	26	-	-	17	-	-	-	-	-	42	1	-	-	2866			43
	97	7	-	-	-	-	-	1	-	-	8	-	-	-	160			8
M	83	17	-	-	-	-	-	-	-	-	17	-	-	-	1133	3	7	17
	89	3	-	-	-	-	-	-	-	-	3	-	-	-	200	5	7	3
	97	7	-	2	6	-	-	4	-	-	19	-	-	-	380	4	6	19
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	6	-	-	-	-	-	-	6	-	-	-	400			6
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	+67%
'89	00%	12%	00%	-84%
'97	00%	07%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'83	1133	Dec:		0%
'89	3466			12%
'97	540			0%

Rosa woodsii																		
Y	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100			5
M	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	5	-	-	-	-	-	-	-	-	5	-	-	-	100	7	10	5

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	00%	00%	00%	
'89	00%	00%	00%	
'97	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'83	0	Dec:		-
'89	0			-
'97	200			-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Symphoricarpos oreophilus																		
S	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	2	-	-	-	-	-	-	-	-	2	-	-	-	133			2
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	83	4	-	-	-	-	-	-	-	-	4	-	-	-	266			4
	89	3	4	-	5	1	-	2	-	-	15	-	-	-	1000			15
	97	12	-	1	2	-	-	2	-	-	17	-	-	-	340			17
M	83	11	1	-	-	-	-	-	-	-	12	-	-	-	800	7	8	12
	89	1	1	-	-	4	-	3	-	-	9	-	-	-	600	10	13	9
	97	24	3	3	14	-	-	3	-	-	45	-	1	-	940	13	12	47
D	83	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	89	-	-	1	-	1	-	-	-	-	2	-	-	-	133			2
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'83	06%	00%	00%	+38%
'89	42%	04%	00%	-26%
'97	05%	06%	02%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'83	1066	Dec:	0%
	'89	1733		8%
	'97	1280		0%