

Trend Study 24-4-08

Study site name: Mud Spring Chaining .

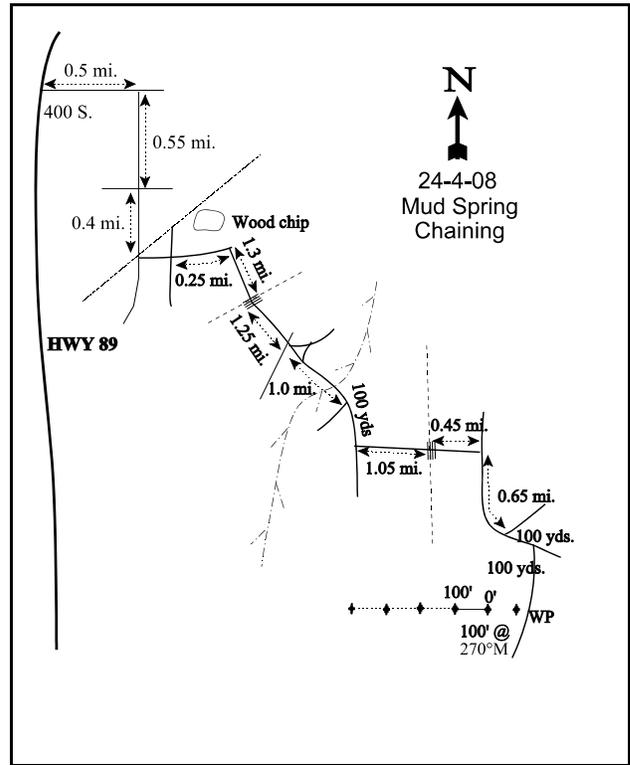
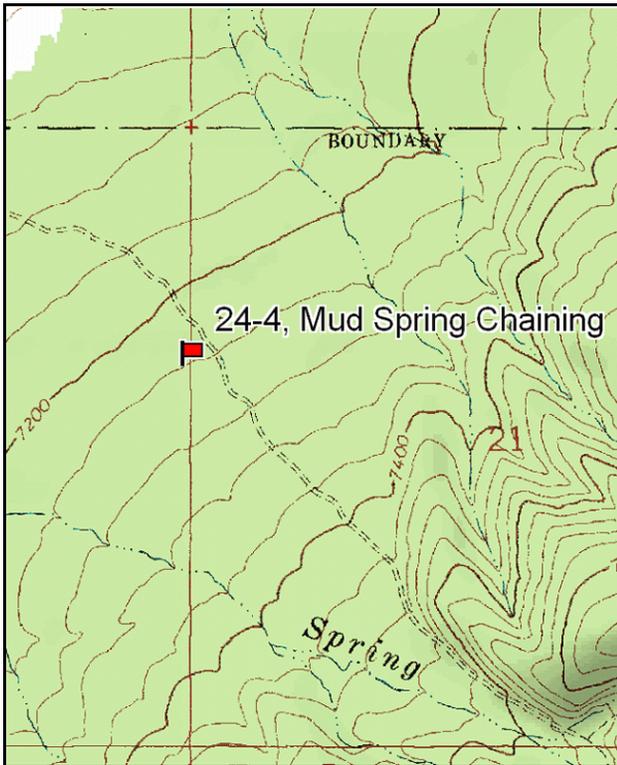
Vegetation type: Chained, Seeded P-J .

Compass bearing: frequency baseline 270 degrees magnetic.

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

LOCATION DESCRIPTION

At the junction of Highway 89 and 400 south in Circleville go east for 0.5 miles. Turn right (south) 200 feet after crossing a bridge. Continue for 0.55 miles to a four-way fork. Go straight through the fork for 0.4 miles to a canal and 5 forked roads. Take the second left road going off at 45 degree angle towards a wood-chip operation. Continue on a road along a hay field for 0.25 miles and turn right. After 1.3 miles there will be a cattleguard and keep going for 1.25 mile to a fork. Stay right (straight) to another fork 1.0 mile away. Turn left at this fork for 100 yards to another fork. At this fork turn left again. After 1.05 miles you will reach the Forest Service boundary/cattleguard. From here continue for 0.45 miles to a fork, turn right and drive for another 0.65 miles. Continue for another 100 yards and stay right and continue to another fork, stay right again and drive to the witness post. The post is off the right side of the road. The 0-foot baseline stake has browse tag #7887.



Map Name: Mt. Dutton

Diagrammatic Sketch

Township 31S, Range 3W, Section 21

GPS: NAD 83, UTM 12S 393773 E, 4218030 N

## DISCUSSION

### Mud Springs Chaining - Trend Study 24-4

#### Study Information

This study samples a key deer winter and spring habitat of chained pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland in the northwest portion of the herd unit in the Mud Spring area [elevation: 7,200 feet (2,195 m), slope: 6%, aspect: northwest]. Deer pellet groups were not abundant with a quadrat frequency of only 8% in 1997, 5% in 2003, but increasing to 20% in 2008. Deer use was estimated to be light in both 2003 and 2008 (7 ddu/acre:18 ddu/ha and 5 ddu/acre:12 ddu/ha, respectively). Elk use was estimated to be minimal in 2008 (2 edu/acre:4 edu/ha). Cattle use has been minimal with some sign of livestock encountered in 1997 and cattle use estimated to be light in 2003 and 2008 (9 cdu/acre:23 cdu/ha and 4 cdu/acre:11 cdu/ha, respectively). All cattle pats encountered in sample years 2003 and 2008 appeared to be from the previous grazing season. Escape and thermal cover is provided by a mature pinyon-juniper woodland that surrounds the chained area, and many 4 to 12 foot pinyon and juniper trees were growing on the chained area in 2003. Many of these trees had been cut down before the 2008 reading. A finger of the 2002 Sanford fire also burned just east of the study site.

#### Soil

The soil is a sandy loam which is neutral in reaction (pH 6.9). The soil is relatively shallow and very rocky with an effective rooting depth estimated at just under 13 inches. Rocks and pavement are common on the surface and in the profile. A considerable amount of organic matter has built up underneath the trees and shrubs. The soil at the site is adequately protected by litter, vegetation, and rock. Relative combined vegetation and litter cover was 55%-60% between 1997 and 2008. Relative combined rock and pavement cover was 28%-30% between 1997 to 2008. There are some areas of bare ground but they are not large or interconnected. Relative bare ground cover was 11%-14% between 1997 and 2008. The area is dissected by several gullies which originate from the canyon to the northeast. Runoff events do not appear to be frequent as there is some vegetation growing in the gully bottoms. Runoff events are likely limited to spring and perhaps some high intensity rain events. The erosion condition rating was classified as stable in 2003 and 2008.

#### Browse

The key shrub species is mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) which accounted for 54% of the total browse cover in 1997, 35% in 2003, and 85% in 2008. It makes up nearly all of the understory shrub cover with a stable density of 933 plants/acre to 1320 plants/acre from 1987 to 2008. Total sagebrush cover averaged just over 6% in 1997, 7% in 2003, and just under 8% in 2008. Mountain big sagebrush was light to moderately utilized sample years 1987 to 2003, but showed moderate to heavy use in 2008. Mountain sagebrush has had good vigor on most plants, and has had low decadence in all sample years. Recruitment of young plants has declined from 89% of the sagebrush population in 1987 to 27% in 2003, and falling to 0% in the 2008 reading. Drought conditions in 2003 may have caused an increase in decadence to 30% of the population. Antelope bitterbrush (*Purshia tridentata*) is also present, although found in such low numbers that it is not a significant component to the community.

Pinyon pine and Utah juniper had become reestablished and/or released by the chaining in 2003, but someone had removed many of the trees through cutting prior to the 2008 reading. Point-quarter data from 1987 estimated 67 pinyon trees/acre, nearly doubling to 129 trees/acre in 1991, decreasing to 90 trees/acre in 1997, but rising again to 123 trees/acre in 2003. Pinyon density decreased to an estimated 34 trees/acre in 2008 due to the cutting between the 2003 and 2008 sample seasons. Point-quarter data estimated juniper densities to be 200 trees/acre in 1987, declining steadily to 59 trees/acre in 2008 (due to cutting). Average diameter of pinyon was similar for 1997 and 2003 at 2.6 to 3 inches, and decreased to 2 inches in 2008. Average diameter of juniper was 4.2 inches for 1997, increased to 5.2 inches in 2003, and decreased to 2.9 inches in 2008. Pinyon was mostly removed during the chaining, and the seedlings that survived had grown to an average

height of two feet by 1987. Prior to the cutting, about 55% of the pinyon were in the 1 to 4 foot height and 35% were 8 to 12 feet in height in 2003. Half of the juniper sampled in 2003 were in the 4 to 8 foot height class. Line intercept canopy cover of pinyon and juniper more than doubled between 1997 and 2003 from 4 to 13% for pinyon and 2% to 5% for juniper. Line intercept canopy cover had decreased to less than 1% for both species in 2008.

#### Herbaceous Understory

The most abundant grass is crested wheatgrass (*Agropyron cristatum*) which accounts for approximately 98% of the grass cover. No other seeded species were encountered on the study. Several other perennial grasses and one sedge (*Carex sp.*) are found on the site, but they only occur rarely. Forbs are rare on the site.

#### 1991 TREND ASSESSMENT

The trend for browse is up. The key browse species, mountain big sagebrush, has increased in density by 26%, while the increaser, broom snakeweed (*Gutierrezia sarothrae*) decreased in density by 68%. The sagebrush density is still quite low at 1,265 plants/acre. Sagebrush vigor and recruitment of young was good, and decadence was low in the population. The trend for both the grasses and forbs is stable. The most common grass is crested wheatgrass with a quadrat frequency of 86%. Forbs occur in very low numbers.

browse - up (+2)

grass - stable (0)

forb - stable (0)

#### 1997 TREND ASSESSMENT

Trend for browse is stable. Density differences of browse species may be related to the larger sample area used in 1997, therefore, trend for browse was determined using other parameters. The key browse species, mountain big sagebrush, maintained good vigor and low decadence. Recruitment remained good with 27% of the population consisting of young plants. The trend for grasses and forbs is stable. The herbaceous understory is totally dominated by crested wheatgrass which currently accounts for 96% of the total herbaceous cover. It has remained stable since 1987 with a quadrat frequency ranging from 86% to 91%. Forbs are rare on the site and the total herbaceous understory has poor composition.

winter range condition (DCI) - fair (57) Mid-level potential scale

browse - stable (0)

grass - stable (0)

forb - stable (0)

#### 2003 TREND ASSESSMENT

Trend for the primary browse species, mountain big sagebrush, is slightly down. Density has increased slightly since 1997, but the number of decadent plants increased to 30% of the population. No seedlings were encountered in 2003 but young recruitment is still good with 16% of the population consisting of young plants. The number of sagebrush plants displaying poor vigor increased from 8% to 18% from 1997. The biggest problem with the browse trend is the increase in cover of pinyon and juniper trees. Density of the trees has increased slightly but average cover has more than doubled since 1997 (5% to 13%). Pinyon and juniper currently make up 62% of the total browse average cover. Total line intercept canopy cover was estimated at nearly 18% in 2003. Trend for the grasses is slightly down with a poor composition. Sum of nested frequency of perennial grass has declined continually since 1987. Nested frequency of the dominant grass, crested wheatgrass, declined slightly but not significantly. Other perennial grasses occur rarely. Trend for forbs is stable. Sum of nested frequency of perennial forbs also declined slightly and forbs remain rare in their occurrence.

winter range condition (DCI) - poor (40) Mid-level potential scale

browse - slightly down (-1)

grass - slightly down (-1)

forb - stable (0)

2008 TREND ASSESSMENT

Trend for browse was slightly up. The density of primary browse species, mountain big sagebrush, increased slightly, though recruitment is low with no young plants sampled. Plants showing poor vigor decreased from 18% in 2003 to 8%. Decadence also decreased from 30% to 15%. The pinyon and juniper on the site were cut between the 2003 and 2008 readings. Average cover of the trees decreased to under 1% and line intercept cover decreased to approximately 1% for both species combined. Trend for the grasses and forbs remained stable. Crested wheatgrass has vigorous growth and still comprises most of the herbaceous understory. A few native perennial grasses occur rarely, and forbs continue to be rare on the site.

winter range condition (DCI) - poor (46) Mid-level potential scale  
browse - slightly up (+1)      grass - stable (0)      forb - stable (0)

HERBACEOUS TRENDS --  
 Management unit 24 , Study no: 4

T y p e	Species	Nested Frequency					Average Cover %		
		'87	'91	'97	'03	'08	'97	'03	'08
G	Agropyron cristatum	257	249	267	234	234	11.16	8.13	12.27
G	Aristida purpurea	-	-	-	4	6	-	.04	.06
G	Bouteloua gracilis	<sub>b</sub> 57	<sub>a</sub> 30	<sub>a</sub> 10	<sub>a</sub> 10	<sub>a</sub> 15	.05	.10	.17
G	Carex sp.	<sub>b</sub> 13	<sub>b</sub> 20	<sub>ab</sub> 8	<sub>a</sub> -	<sub>a</sub> -	.02	-	-
G	Oryzopsis hymenoides	4	5	3	-	-	.03	-	-
G	Poa fendleriana	<sub>b</sub> 13	<sub>a</sub> 1	<sub>a</sub> -	<sub>a</sub> -	<sub>a</sub> -	-	-	-
G	Sitanion hystrix	<sub>b</sub> 31	<sub>b</sub> 29	<sub>a</sub> 9	<sub>a</sub> 5	<sub>ab</sub> 19	.07	.04	.32
G	Stipa comata	<sub>b</sub> 16	<sub>ab</sub> 10	<sub>a</sub> 2	<sub>a</sub> -	<sub>a</sub> -	.00	.00	-
Total for Annual Grasses		0	0	0	0	0	0	0	0
Total for Perennial Grasses		391	344	299	253	274	11.34	8.31	12.83
Total for Grasses		391	344	299	253	274	11.34	8.31	12.83
F	Arabis sp.	<sub>b</sub> 19	<sub>a</sub> 1	<sub>a</sub> 6	<sub>a</sub> -	<sub>a</sub> -	.01	-	-
F	Astragalus sp.	-	3	-	3	3	-	.00	.00
F	Chaenactis douglasii	-	-	-	-	4	-	-	.04
F	Cryptantha sp.	7	3	3	-	-	.01	-	-
F	Cymopterus sp.	-	-	-	1	-	-	.00	-
F	Descurainia pinnata (a)	-	-	-	3	-	-	.00	-
F	Erigeron pumilus	<sub>b</sub> 19	<sub>ab</sub> 11	<sub>a</sub> 2	<sub>a</sub> -	<sub>a</sub> 4	.01	-	.01
F	Hymenopappus filifolius	<sub>ab</sub> 11	<sub>b</sub> 23	<sub>b</sub> 23	<sub>ab</sub> 9	<sub>a</sub> 1	.22	.04	.03
F	Machaeranthera canescens	-	1	2	1	-	.00	.00	-
F	Penstemon pachyphyllus	9	4	-	-	-	-	-	-
F	Phlox hoodii	3	-	-	-	-	-	-	-
F	Streptanthus cordatus	-	-	-	1	1	-	.00	.00
F	Tragopogon dubius	1	-	-	-	-	-	-	-
Total for Annual Forbs		0	0	0	3	0	0	0.00	0

Type	Species	Nested Frequency					Average Cover %		
		'87	'91	'97	'03	'08	'97	'03	'08
	Total for Perennial Forbs	69	46	36	15	13	0.26	0.05	0.09
	Total for Forbs	69	46	36	18	13	0.26	0.06	0.09

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

#### BROWSE TRENDS --

Management unit 24 , Study no: 4

Type	Species	Strip Frequency			Average Cover %		
		'97	'03	'08	'97	'03	'08
B	Artemisia tridentata vaseyana	31	33	37	6.21	7.33	7.69
B	Chrysothamnus nauseosus	0	0	1	-	-	0.0
B	Eriogonum microthecum	1	1	0	.00	.00	-
B	Gutierrezia sarothrae	11	18	23	.08	.34	.39
B	Juniperus osteosperma	5	11	4	.03	4.46	.56
B	Opuntia sp.	2	5	2	.03	.15	.01
B	Pinus edulis	13	11	1	5.18	8.68	.00
B	Purshia tridentata	1	1	2	0.0	0.0	0.0
B	Yucca sp.	1	1	1	.03	.15	.38
	Total for Browse	65	81	71	11.57	21.12	9.05

#### CANOPY COVER, LINE INTERCEPT --

Management unit 24 , Study no: 4

Species	Percent Cover		
	'97	'03	'08
Artemisia tridentata vaseyana	-	5.05	9.14
Chrysothamnus nauseosus	-	-	.26
Gutierrezia sarothrae	-	.20	.43
Juniperus osteosperma	1.79	4.98	.61
Pinus edulis	3.59	12.80	.46

#### KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 24 , Study no: 4

Species	Average leader growth (in)	
	'03	'08
Artemisia tridentata vaseyana	2.0	2.1

POINT-QUARTER TREE DATA --  
Management unit 24 , Study no: 4

Species	Trees per Acre		
	'97	'03	'08
Juniperus osteosperma	127	104	59
Pinus edulis	90	123	34

Average diameter (in)		
'97	'03	'08
4.2	5.2	2.9
3.0	2.6	2.0

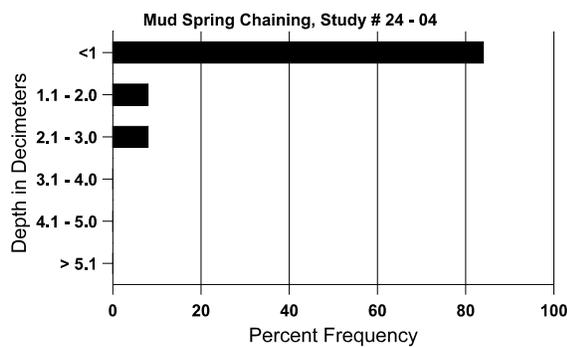
BASIC COVER --  
Management unit 24 , Study no: 4

Cover Type	Average Cover %				
	'87	'91	'97	'03	'08
Vegetation	4.25	4.00	26.82	28.81	21.45
Rock	20.50	27.50	18.86	23.96	17.90
Pavement	4.25	6.75	13.48	12.83	13.62
Litter	53.75	41.50	37.68	34.77	45.72
Cryptogams	0	0	.06	.39	.13
Bare Ground	17.25	20.25	14.53	16.46	12.27

SOIL ANALYSIS DATA --  
Management unit 24, Study no: 4, Study Name: Mud Spring Chaining

Effective rooting depth (in)	Temp °F (depth)	pH	sandy loam			%OM	PPM P	PPM K	dS/m
			%sand	%silt	%clay				
12.7	67.7 (10.0)	6.9	67.0	18.4	14.6	3.6	38.4	608.0	0.5

### Stoniness Index



PELLET GROUP DATA --

Management unit 24 , Study no: 4

Type	Quadrat Frequency		
	'97	'03	'08
Rabbit	9	16	51
Elk	-	1	1
Deer	8	5	20
Cattle	3	2	5

Days use per acre (ha)	
'03	'08
-	-
-	2 (5)
7 (18)	5 (12)
9 (23)	4 (11)

BROWSE CHARACTERISTICS --

Management unit 24 , Study no: 4

		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 tridentata vaseyana</i>												
87	<b>932</b>	33	833	99	-	-	89	0	0	-	0	43/43
91	<b>1265</b>	233	833	366	66	-	18	0	5	-	0	11/13
97	<b>1040</b>	180	280	680	80	40	23	2	8	8	8	22/37
03	<b>1220</b>	-	200	660	360	60	15	8	30	18	18	19/28
08	<b>1320</b>	20	-	1120	200	140	41	29	15	6	8	23/36
<i>Chrysothamnus nauseosus</i>												
87	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
91	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
97	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
03	<b>0</b>	-	-	-	-	-	0	0	-	-	0	24/21
08	<b>40</b>	-	-	40	-	-	0	0	-	-	0	14/16
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
87	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
91	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
97	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
03	<b>0</b>	-	-	-	-	-	0	0	-	-	0	13/18
08	<b>0</b>	-	-	-	-	-	0	0	-	-	0	15/21
<i>Eriogonum microthecum</i>												
87	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
91	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
97	<b>20</b>	-	20	-	-	-	0	0	-	-	0	-/-
03	<b>40</b>	-	-	40	-	-	0	0	-	-	0	4/4
08	<b>0</b>	-	-	-	-	-	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)
<i>Gutierrezia sarothrae</i>												
87	<b>3298</b>	-	433	2799	66	-	1	0	2	-	2	7/7
91	<b>1065</b>	-	299	633	133	-	0	0	12	2	3	4/4
97	<b>260</b>	-	20	220	20	-	0	0	8	-	0	8/12
03	<b>760</b>	20	-	540	220	740	0	0	29	11	11	7/9
08	<b>800</b>	120	20	660	120	160	0	0	15	13	13	6/8
<i>Juniperus osteosperma</i>												
87	<b>199</b>	-	133	66	-	-	0	0	-	-	0	79/39
91	<b>132</b>	33	99	33	-	-	50	0	-	-	0	108/33
97	<b>100</b>	20	20	80	-	20	0	0	-	-	20	-/-
03	<b>220</b>	-	60	160	-	20	0	0	-	-	0	-/-
08	<b>80</b>	-	20	60	-	-	0	0	-	-	25	-/-
<i>Opuntia sp.</i>												
87	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
91	<b>33</b>	-	33	-	-	-	0	0	-	-	0	-/-
97	<b>60</b>	-	40	20	-	-	0	0	-	-	0	6/8
03	<b>120</b>	-	-	120	-	-	0	0	-	-	0	4/10
08	<b>60</b>	20	-	60	-	-	0	0	-	-	0	3/3
<i>Pediocactus simpsonii</i>												
87	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
91	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
97	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
03	<b>0</b>	-	-	-	-	-	0	0	-	-	0	2/2
08	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
<i>Pinus edulis</i>												
87	<b>33</b>	33	33	-	-	-	0	0	-	-	0	-/-
91	<b>33</b>	33	33	-	-	-	0	0	-	-	0	-/-
97	<b>280</b>	-	60	220	-	20	0	0	-	-	0	-/-
03	<b>240</b>	-	20	220	-	-	0	0	-	-	0	-/-
08	<b>20</b>	-	-	20	-	-	0	0	-	-	0	-/-
<i>Purshia tridentata</i>												
87	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
91	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
97	<b>20</b>	-	-	20	-	-	100	0	-	-	0	23/52
03	<b>20</b>	-	-	20	-	-	0	100	-	-	0	30/44
08	<b>40</b>	-	-	40	-	-	50	50	-	-	0	18/44

		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)
Sclerocactus sp.												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
91	0	-	-	-	-	-	0	0	-	-	0	-/-
97	0	-	-	-	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	-/-
08	0	-	-	-	-	-	0	0	-	-	0	4/12
Yucca sp.												
87	0	-	-	-	-	-	0	0	-	-	0	-/-
91	0	-	-	-	-	-	0	0	-	-	0	-/-
97	20	-	-	20	-	-	0	0	-	-	0	7/15
03	40	-	-	40	-	-	0	0	-	-	0	20/24
08	20	-	-	20	-	-	0	0	-	-	0	12/23