

Trend Study 25C-6-08

Study site name: Terza Flat.

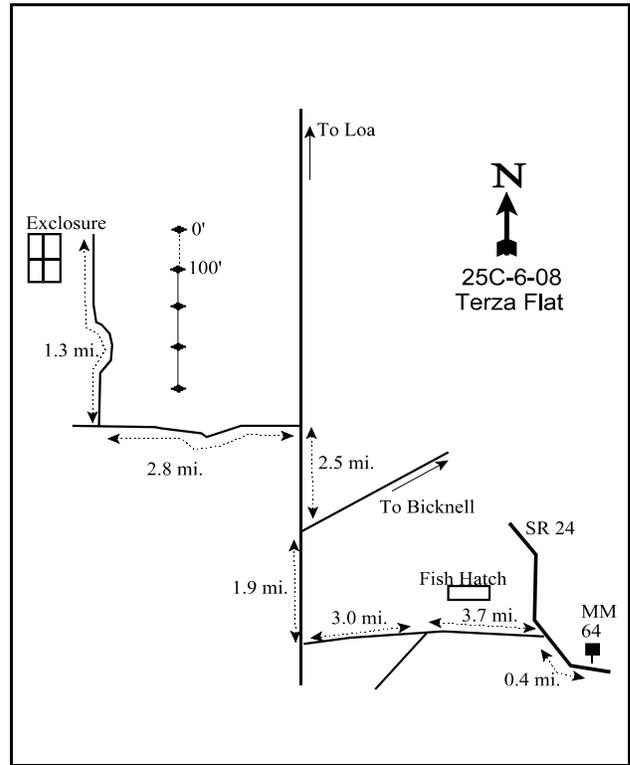
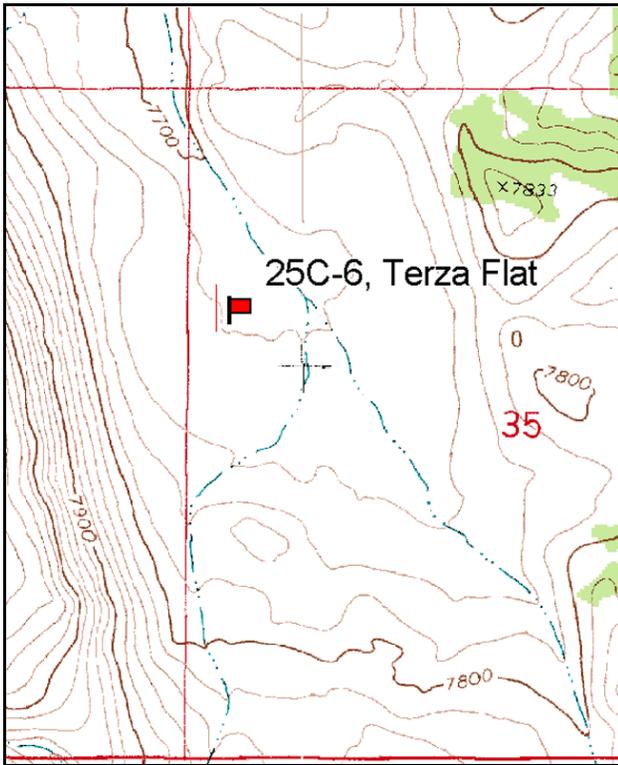
Vegetation type: Wyoming big sagebrush.

Compass bearing: frequency baseline 180 degrees magnetic.

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

LOCATION DESCRIPTION

South of Bicknell, turn on the road (east) towards Bicknell Fish Hactery. This road is 0.4 miles north of mile marker 64. Travel east for 3.7 miles to a fork, stay right at fork (sign says left is toward King’s Ranch). Continue 3.0 miles to an intersection. Turn right (north) and go 1.9 miles to a fork, stay left (straight) for another 2.5 miles to a road going left (west). Drive 2.8 miles to a road going left (north). Take this road for 1.3 miles to an enclosure. Drive to the northeast corner of the enclosure. The 0-foot end of the baseline is 200 feet east of the corner in line with the fence. The 0-foot stake is a fencepost marked by browse tag #7178. The other stakes are marked by rebar.



Map Name: Moroni Peak

Diagrammatic Sketch

Township 29S, Range 2E, Section 35

GPS: NAD 83, UTM 12S 441497 E, 4243112 N

## DISCUSSION

### Terza Flat - Trend Study No. 25C-6

#### Study Information

This study is on BLM land which was reportedly the most heavily used site encountered during the 1985 field season [elevation: 7,600 feet (2,316 m), slope: 3%, aspect: northeast]. An experimental exclosure located near the transect contains vigorous stands of winterfat (*Ceratoides lanata*) and sagebrush (*Artemisia* spp.) where livestock have been excluded. In contrast, Russian thistle (*Salsola iberica*), broom snakeweed (*Gutierrezia sarothrae*), halogeton (*Halogeton glomeratus*), and narrowleaf low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *stenophyllus*) are dominant outside the exclosure. Sheep are allowed to graze the allotment each winter, followed by cattle each spring. Antelope are present in the area year-round. It is difficult to differentiate between antelope, deer, and sheep sign on this site. Antelope/deer use was estimated to be heavy in 1998 (56 adu/acre:138 adu/ha), light in 2003 (11 adu/acre:26 adu/ha), and moderate in 2008 (24 adu/acre:60 adu/ha). There was light use by elk in 1998 (9 edu/acre:22 edu/ha), only 1 elk pellet group encountered in 2003, and none in 2008. Cattle use was similar with minimal use in 1998 (3 cdu/acre:7 cdu/ha), 1 cattle pat encountered in 2003, and none in 2008. Sheep sign was also noted in small numbers in 1998. Rabbits were also present in high numbers. A colony of Utah prairie dogs was reported to be present 1/4 mile southeast of the Terza Flat study site in 1985.

#### Soil

The soil is moderately deep with an effective rooting depth of 14 inches. There may be a hardpan between 12 to 18 inches below the surface. Soil texture is a sandy clay loam which is neutral in reaction (pH 7.2). Phosphorus is low at 7.7 ppm, when values between 6-11 ppm may have marginal availability for plant growth and development (Tiedemann and Lopez 2004). Relative combined vegetation and litter cover ranged from 22%-31% since 1994. Relative combined rock and pavement cover has increased from 33% in 1994 to 51% in 2008. Relative bareground cover reached a high of 40% in 1998 and has since decreased to 20% in 2008. Perennial herbaceous cover is lacking and erosion is ongoing. The erosion condition class was determined to be moderate in 2003. Even with the slight slope, high intensity rain just prior to the 2003 reading caused considerable rills, flow patterns, and soil movement. The erosion condition class was determined to be stable in 2008.

#### Browse

This site is dominated by invaders and increasers. Together, the increaser forbs and shrubs made up 88% of the total vegetation cover in 1994 and 77% in 1998. The dominant browse include narrowleaf low rabbitbrush and Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). Winterfat is also an important browse species on the site but plants are small, measuring only 3 to 6 inches in height. Total cover of winterfat has averaged less than 0.25% since 1994. Judging from scattered stumps found throughout the area, Wyoming big sagebrush was once the dominant species, but has declined to only 720 plants/acre by 2008. Its patchy distribution has partially contributed to the changes in population between 1991 and 1994 when a larger sample was used to give a better estimate of population density. The Wyoming big sagebrush plants were moderately to heavily hedged in 1991 but more lightly used until 2008 when heavy use was recorded. The larger sample used in 1994 also picked up some black sagebrush (*Artemisia nova*).

The winterfat population numbered around 1,200 plants/acre in 1994 and 1998. Use was extremely heavy in 2003 and 2008, and the short stature of the plants (6 inches) is likely due to continued heavy use. Density declined to only 460 plants/acre in 2003 and further to only 360 plants/acre in 2008. Vigor has remained normal on most plants during all readings, and decadence was low from 1998 to 2008. Winterfat is as dense in the livestock exclosure as rabbitbrush is on the outside. Plants are large and vigorous measuring about 12 inches in height. Another preferred browse species, fourwing saltbush (*Atriplex canescens*), is declining. In 1991, 100% of the fourwing were heavily hedged and all were considered decadent. Density declined by 57%

from 932 plants/acre to 400 between 1985 and 1991, and density continued to decline in 1994 and 1998. In 2003, no fourwing saltbush was sampled and only 20 plant/acre were estimated in 2008. Fringed sagebrush (*Artemisia frigida*) has followed a similar trend, but appears to be slightly rebounding. Density has declined from 4,260 plants/acre in 1994 to only 140 plants/acre in 2003, but increased to 700 plant/acre in 2008.

Narrowleaf low rabbitbrush and broom snakeweed are increasers of little value. Both increased substantially in 1991. Density of rabbitbrush increased to 11,140 plants/acre in 1994 and has remained relatively stable since. Broom snakeweed has fluctuated in density over the years and there may have been some identification problems with narrowleaf low rabbitbrush in 1991.

#### Herbaceous Understory

Composition of the herbaceous vegetation is extremely poor. Halogeton dominates the herbaceous understory. It was noted growing only along the road and was not encountered on the frequency belts in 1985. By 1994, halogeton had spread throughout the site and had a quadrat frequency of 32%. Nested frequency declined significantly by 1998, but halogeton was still the most numerous herbaceous plant on the site. Nested frequency increased significantly in 2003 and cover increased to 7%. Locoweed (*Astragalus sp.*) and one low fleabane (*Erigeron pumilus*) were the only perennial forbs sampled on the transect. Grasses are rare and only two species were encountered in 1998, bottlebrush squirreltail (*Sitanion hystrix*) and Indian ricegrass (*Oryzopsis hymenoides*). Grasses provided less than 0%-0.5% cover on the site from 1998 to 2008.

#### 1991 TREND ASSESSMENT

The more desirable species, Wyoming big sagebrush and winterfat, have contradicting density trends. The Wyoming big sagebrush has increased by 39%, up to 3,732 plants per acre, while winterfat has decreased by 36%, now down to only 466 plants per acre. Twenty-nine percent of the winterfat is decadent and is not reproducing. Overall, there was a gain in browse, but low rabbitbrush and broom snakeweed both increased by a remarkably large 62% and 93% respectively. The trend for browse is down with the large increases for weedy increaser species. There is only one perennial grass, bottlebrush squirreltail, which is quite small and only has a quadrat frequency of 21%. The trend for grasses is stable, but in extremely poor condition. Forbs are mostly weedy invaders. Russian thistle has decreased significantly in nested frequency, which would have to be considered an improvement. However, halogeton has invaded the site and now has a quadrat frequency of 32%. The trend for the forbs is considered slightly down and extremely poor.

browse - down (-2)

grass - stable (0)

forb - slightly down (-1)

#### 1994 TREND ASSESSMENT

Density of the key browse, Wyoming big sagebrush, declined from 3,732 plants/acre to 440, while winterfat density increased 58%, from 466 to 1,120 plants/acre. Fourwing saltbush also declined in density from 400 to 200 plants/acre. The larger sample used in 1994 is likely responsible for most of the changes in density. Shrubs on this site, especially sagebrush, occur in scattered clumps. The new, larger sample better estimates shrub populations which have this type of distribution. With this in mind, the key browse species appear to have stable populations. Wyoming big sagebrush displays no decadence. Fourwing and winterfat also show lighter use and improved decadency rates. Increasers, narrowleaf low rabbitbrush and broom snakeweed, appear to have been misidentified during past readings. Combined, these species density declined 61% from 1991 to 13,760 plants/acre. These species were widespread over the whole site and density estimates between the old and new, larger sample should be comparable. With all of this in mind, trend for browse is stable. Trend for the grasses and forbs is stable but with continued dominance by weedy species. Grasses are rare and produced less than 0.5% cover. Forbs are also lacking and dominated by halogeton and Russian thistle which provide 99% of the forb cover.

winter range condition (DCI) - very poor (3) Low potential scale

browse - stable (0)

grass - stable (0)

forb - stable (0)

### 1998 TREND ASSESSMENT

Trend for the key browse species, black sagebrush, Wyoming big sagebrush, and winterfat appears stable. Fourwing saltbush does appear to be declining however. One positive trend indicator is the decline in abundance of narrowleaf low rabbitbrush and broom snakeweed. Rabbitbrush still has a high number of seedlings and young however. Trend for the grasses is stable, but grasses are extremely rare and provide little production. Trend for the forbs is slightly up with a decline in the sum of nested frequency of annual forbs. Nested frequency of halogeton and Russian thistle have both declined significantly which is an improvement, but there are no forbs or grasses to replace them. The DCI score increased due to preferred browse increasing over 5%, therefore percent decadence and percent young scores were included.

winter range condition (DCI) - poor-fair (25) Low potential scale  
browse - stable (0)                      grass - stable (0)                      forb - slightly down (-1)

### 2003 TREND ASSESSMENT

Trend for browse is down. Density of black and Wyoming big sagebrush combined has declined slightly while percent decadence of both sagebrush species has increased. Fourwing saltbush was not sampled in 2003 and winterfat declined 67% to only 460 plants/acre. Recruitment was low for preferred browse species. Narrowleaf low rabbitbrush continues to dominate the site. Trend for grasses and forbs is also down. No grasses were sampled in 2003 and halogeton increased significantly. It currently accounts for 98% of the total herbaceous cover. Only a few other annual forbs were sampled. The nearby exclosure contains a high density of winterfat and little halogeton illustrating that the changes in trend are due primarily to past and present grazing pressure.

winter range condition (DCI) - very poor (3) Low potential scale  
browse - down (-2)                      grass - down (-2)                      forb - down (-2)

### 2008 TREND ASSESSMENT

Trend for browse is stable, but in poor condition. Density of fringed sagebrush, Wyoming big sagebrush, and fourwing saltbush increased slightly, but winterfat and black sagebrush density decreased. Vigor was good and decadence was low on most browse species, but decadence did increase to 17% in the winterfat population. Increaser shrub populations remained fairly constant. Grasses were not encountered on the site. The trend must be considered stable. The trend for forbs is also stable, but in extremely poor condition. Halogeton still dominates the site and provides 100% of the herbaceous cover.

winter range condition (DCI) - very poor (3) Low potential scale  
browse - stable (0)                      grass - stable (0)                      forb - stable (0)

HERBACEOUS TRENDS --  
 Management unit 25C, Study no: 6

Type	Species	Nested Frequency						Average Cover %			
		'85	'91	'94	'98	'03	'08	'94	'98	'03	'08
G	Oryzopsis hymenoides	-	-	-	2	-	-	-	.00	-	-
G	Sitanion hystrix	<sub>ab</sub> 17	<sub>c</sub> 50	<sub>bc</sub> 41	<sub>bc</sub> 36	<sub>a</sub> -	<sub>a</sub> -	.44	.39	-	.00
Total for Annual Grasses		0	0	0	0	0	0	0	0	0	0
Total for Perennial Grasses		17	50	41	38	0	0	0.43	0.39	0	0.00
Total for Grasses		17	50	41	38	0	0	0.43	0.39	0	0.00
F	Astragalus sp.	8	5	4	-	-	4	.01	-	-	.01
F	Chenopodium fremontii (a)	-	-	7	-	9	-	.02	-	.09	-
F	Chenopodium leptophyllum(a)	-	-	-	-	2	-	-	-	.01	-
F	Descurainia sp. (a)	-	-	-	1	-	-	-	.01	-	-
F	Draba sp. (a)	-	-	4	-	-	-	.01	-	-	-
F	Eriogonum cernuum (a)	-	-	-	-	-	-	-	-	.00	-
F	Erigeron pumilus	2	2	-	-	-	-	-	-	-	-
F	Halogeton glomeratus (a)	-	<sub>a</sub> 74	<sub>ab</sub> 97	<sub>a</sub> 69	<sub>b</sub> 120	<sub>b</sub> 128	2.83	1.65	7.03	9.55
F	Lappula occidentalis (a)	-	-	-	7	-	-	-	.01	-	-
F	Polygonum douglasii (a)	-	-	4	-	-	-	.00	-	-	-
F	Ranunculus testiculatus (a)	-	-	-	-	-	4	-	-	-	.00
F	Salsola iberica (a)	<sub>b</sub> 216	<sub>b</sub> 41	<sub>b</sub> 55	<sub>a</sub> -	<sub>a</sub> -	<sub>a</sub> -	1.01	-	-	-
Total for Annual Forbs		216	115	167	77	131	132	3.88	1.67	7.14	9.55
Total for Perennial Forbs		10	7	4	0	0	4	0.00	0	0	0.01
Total for Forbs		226	122	171	77	131	136	3.89	1.67	7.14	9.56

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

BROWSE TRENDS --

Management unit 25C, Study no: 6

Type	Species	Strip Frequency				Average Cover %			
		'94	'98	'03	'08	'94	'98	'03	'08
B	Artemisia frigida	50	27	6	16	.56	.78	.06	.06
B	Artemisia nova	7	8	3	1	.36	.96	.03	.15
B	Artemisia tridentata wyomingensis	13	15	19	22	1.05	2.27	2.37	2.41
B	Atriplex canescens	9	4	0	1	.00	.00	-	.00
B	Ceratoides lanata	29	30	18	11	.15	.37	.22	.09
B	Cercocarpus ledifolius	0	0	0	1	-	-	-	.00
B	Chrysothamnus viscidiflorus stenophyllus	78	79	69	75	7.21	10.93	6.34	5.80
B	Gutierrezia sarothrae	25	5	26	18	.23	.09	.33	.42
B	Opuntia sp.	0	0	0	1	-	-	-	.00
Total for Browse		211	168	141	146	9.56	15.42	9.36	8.95

CANOPY COVER, LINE INTERCEPT --

Management unit 25C, Study no: 6

Species	Percent Cover	
	'03	'08
Artemisia frigida	-	.06
Artemisia nova	.03	-
Artemisia tridentata wyomingensis	2.61	3.66
Ceratoides lanata	.28	.11
Chrysothamnus viscidiflorus stenophyllus	8.75	11.36
Gutierrezia sarothrae	.23	.21

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 25C, Study no: 6

Species	Average leader growth (in)	
	'03	'08
Artemisia tridentata wyomingensis	1.1	1.6

BASIC COVER --

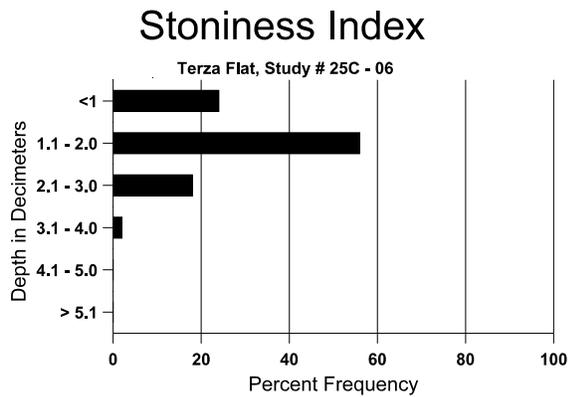
Management unit 25C, Study no: 6

Cover Type	Average Cover %					
	'85	'91	'94	'98	'03	'08
Vegetation	2.50	6.50	13.80	17.43	16.77	19.13
Rock	2.50	3.75	6.61	6.38	9.92	6.07
Pavement	30.50	38.25	25.40	30.49	34.85	53.68
Litter	35.25	13.25	16.29	12.10	6.94	13.36
Cryptogams	0	0	.01	.20	.04	.21
Bare Ground	29.25	38.25	33.95	43.59	38.86	23.02

SOIL ANALYSIS DATA --

Management unit 25C, Study no: 6, Study Name: Terza Flat

Effective rooting depth (in)	Temp °F (depth)	pH	sandy clay loam			%0M	PPM P	PPM K	ds/m
			% sand	% silt	% clay				
13.7	59.0 (15.0)	7.2	50.0	25.4	24.6	1.4	7.7	128.0	0.6



PELLET GROUP DATA --

Management unit 25C, Study no: 6

Type	Quadrat Frequency			
	'94	'98	'03	'08
Rabbit	74	64	39	85
Elk	4	6	-	2
Deer/antelope	20	51	6	21
Cattle	-	1	-	1

Days use per acre (ha)		
'98	'03	'08
-	-	-
9 (22)	1 (2)	-
56 (138)	11 (26)	24 (60)
3 (7)	1 (2)	-

BROWSE CHARACTERISTICS --  
Management unit 25C, Study no: 6

		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)
<b>Artemisia frigida</b>												
85	<b>5932</b>	466	599	5333	-	-	0	0	0	-	0	11/12
91	<b>35798</b>	1199	10133	25399	266	-	5	1	1	-	.18	4/6
94	<b>4260</b>	-	160	2980	1120	980	0	0	26	18	18	2/4
98	<b>1320</b>	4240	300	1000	20	-	20	5	2	-	0	4/6
03	<b>140</b>	-	-	140	-	-	0	14	0	-	0	4/5
08	<b>700</b>	20	80	600	20	-	40	23	3	-	0	3/6
<b>Artemisia nova</b>												
85	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
91	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
94	<b>460</b>	-	-	460	-	120	0	0	0	-	0	12/21
98	<b>360</b>	-	40	300	20	20	39	0	6	-	0	11/18
03	<b>60</b>	-	-	20	40	-	33	0	67	-	0	15/24
08	<b>20</b>	-	-	20	-	100	0	0	0	-	0	10/24
<b>Artemisia tridentata wyomingensis</b>												
85	<b>2265</b>	2399	1866	333	66	-	0	0	3	-	0	15/17
91	<b>3731</b>	-	266	3199	266	-	45	16	7	.53	4	9/15
94	<b>440</b>	-	-	440	-	160	9	0	0	-	0	11/20
98	<b>520</b>	-	60	380	80	20	19	4	15	-	0	17/29
03	<b>640</b>	-	20	420	200	40	9	3	31	19	19	21/36
08	<b>720</b>	40	60	520	140	280	19	47	19	6	8	16/27
<b>Atriplex canescens</b>												
85	<b>932</b>	-	133	733	66	-	14	7	7	-	0	12/12
91	<b>399</b>	-	-	-	399	-	0	100	100	30	100	-/-
94	<b>200</b>	-	-	200	-	-	10	40	0	-	0	6/6
98	<b>80</b>	-	80	-	-	-	25	0	0	-	0	-/-
03	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
08	<b>20</b>	-	20	-	-	-	0	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>Ceratoides lanata</i>												
85	<b>732</b>	-	66	666	-	-	0	0	0	-	0	5/4
91	<b>466</b>	-	-	333	133	-	29	43	29	4	14	4/4
94	<b>1120</b>	-	-	860	260	80	36	0	23	9	9	4/5
98	<b>1380</b>	60	160	1200	20	-	48	20	1	-	1	3/5
03	<b>460</b>	-	-	440	20	-	0	91	4	4	4	6/8
08	<b>360</b>	60	60	240	60	100	11	83	17	-	0	3/5
<i>Cercocarpus ledifolius</i>												
85	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
91	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
94	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
98	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
03	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
08	<b>80</b>	-	-	80	-	-	0	100	-	-	0	22/42
<i>Chrysothamnus viscidiflorus stenophyllus</i>												
85	<b>1732</b>	533	999	733	-	-	0	0	0	-	0	7/11
91	<b>4598</b>	-	1666	2466	466	-	23	4	10	.43	1	8/13
94	<b>11140</b>	660	1480	8920	740	960	0	0	7	3	3	6/14
98	<b>10920</b>	720	2800	6680	1440	420	.73	0	13	1	3	8/14
03	<b>9200</b>	-	240	8240	720	240	0	1	8	4	4	8/13
08	<b>11360</b>	20	900	8760	1700	660	39	18	15	2	5	7/14
<i>Gutierrezia sarothrae</i>												
85	<b>1999</b>	-	533	1466	-	-	0	0	0	-	0	9/11
91	<b>30665</b>	199	4799	25533	333	-	0	0	1	.13	.86	7/10
94	<b>1300</b>	40	20	1060	220	2020	0	0	17	8	8	5/6
98	<b>120</b>	580	-	120	-	20	0	0	0	-	0	5/6
03	<b>720</b>	-	-	720	-	-	0	0	0	-	0	6/9
08	<b>720</b>	-	-	720	-	-	0	0	0	-	0	5/7
<i>Opuntia sp.</i>												
85	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
91	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
94	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
98	<b>0</b>	-	-	-	-	-	0	0	-	-	0	6/12
03	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
08	<b>20</b>	-	-	20	-	-	0	0	-	-	0	5/10

		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)	
Rosa woodsii													
85	0	-	-	-	-	-	0	0	-	-	0	-/-	
91	0	-	-	-	-	-	0	0	-	-	0	-/-	
94	0	-	-	-	-	-	0	0	-	-	0	-/-	
98	0	-	-	-	-	-	0	0	-	-	0	6/16	
03	0	-	-	-	-	-	0	0	-	-	0	-/-	
08	0	-	-	-	-	-	0	0	-	-	0	-/-	