

WOODRUFF CO-OP - TREND STUDY NO. 2-36-11

Vegetation Type: Wyoming Big Sagebrush

Range Type: Crucial Deer Winter

NRCS Ecological Site Description: [Semidesert Loam \(Wyoming Big Sagebrush\), R034XY212UT](#)

Land Ownership: DWR

Elevation: 6,550 ft (1996 m)

Aspect: South

Slope: 2%

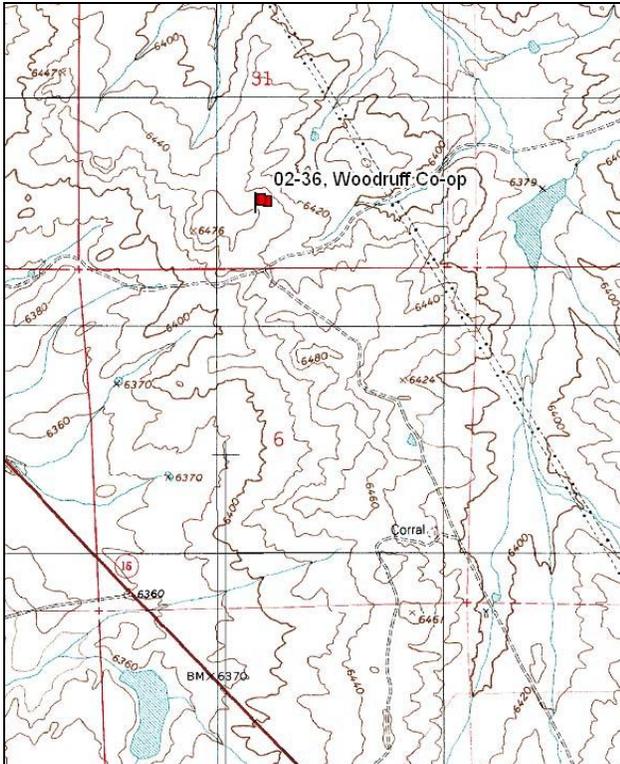
Transect bearing: 170° magnetic

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

Directions:

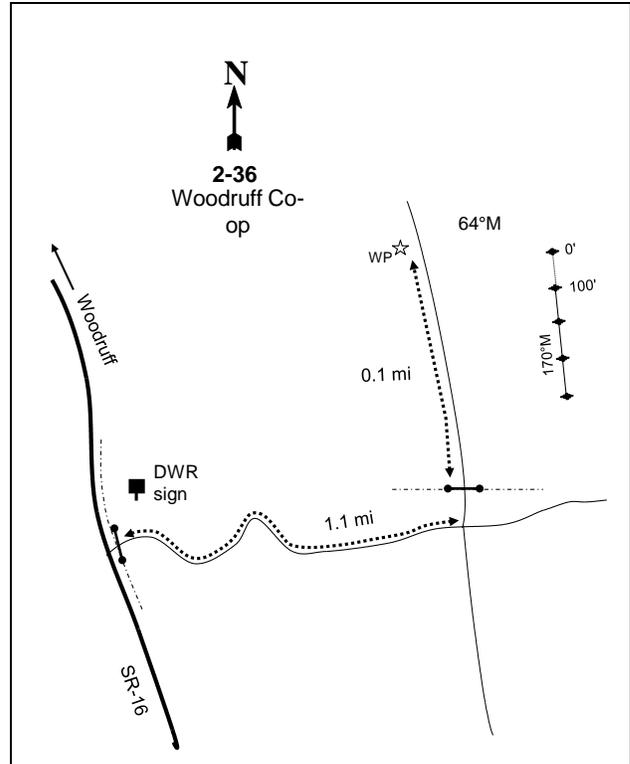
From the junction of SR-39 and SR-16 in Woodruff, travel south on SR-16, 5.7 miles to the Woodruff Co-op Livestock Management Area. Turn left (east) through the gate. Drive 1.1 miles to a fork. Turn left and go north through the gate. From the gate, go 0.1 miles. The study is on the east side of the road, approximately 60 paces to the 0-foot baseline stake. The study stakes are short fenceposts. The 0-foot baseline stake is marked with browse tag #131. The baseline has a small dogleg from 300-400.

Map Name: Neponset Reservoir NE



Township: 9N Range: 8E Section: 31

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 493109 E 4590692 N

Site Information

Site Description: This study was established in 1990 on land administered by Utah Division of Wildlife Recourses (UDWR) to monitor Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) reestablishment in an area, which is dominated by introduced perennial grasses. In 2003, 173 acres were disked twice and drill seeded (Table - Seed Mix) in the fall to establish more shrubs and to increase diversity within the community. Livestock were allowed back onto the allotment in 2005. The allotment continues to be used for spring cattle grazing. Pronghorn use in the area is year round, while deer and elk use is in the winter. Signs of sage-grouse are also common. Deer and pronghorn pellet groups are combined due to their similarity in appearance. Deer/pronghorn pellet groups were sampled in low abundance in 2001 and 2006, but moderate abundance in 2011. Pronghorn were in the area in 2011 at the time of sampling. Elk pellet groups were sampled in low abundance in 2001 and 2006. No pellet groups were sampled for elk in 2011. Sampled cattle pats were sampled in high abundance in 2001, but low abundance in 2006. No cattle sign was observed in 2011. Only one sage-grouse pellet group was encountered in 2006 (Table - Pellet Group Data).

Browse: Wyoming big sagebrush and winterfat (*Ceratoides lanata*) are the most important browse species on this study, although a small population of fourwing saltbush (*Atriplex canescens*) was observed for the first time in 2006. Fourwing saltbush was seeded in the 2003 treatment. Sagebrush density has been sparse for the duration of the study and has little variability in density. The sagebrush population is mostly mature and has displayed good vigor. Since 1996, decadence within the sagebrush population has been low; however decadence was high in 1984. The sagebrush population has had light to moderate use over the sample years. The recruitment of young sagebrush has been good over the sample years with the exception of 1996. Winterfat was the most abundant shrub on the study in 2001, but was almost completely absent by 2006 (Table - Browse Characteristics). Winterfat cover was low, and like sagebrush was decreased by the disk treatment (Table - Browse Trends). Other browse species that are present include low rabbitbrush (*Chrysothamnus viscidiflorus* ssp. *viscidiflorus*), broom snakeweed (*Gutierrezia sarothrae*), gray horsebrush (*Tetradymia canescens*), and pricklypear cactus (*Opuntia polyacantha*) (Table - Browse Characteristics).

Herbaceous Understory: The herbaceous understory is dominated by crested wheatgrass (*Agropyron cristatum*), which has accounted for the majority of vegetation cover since 1996. Crested wheatgrass had been moderately utilized in 2001 and 2006. Sandberg bluegrass (*Poa secunda*), needle-and-thread (*Stipa comata*), and Indian ricegrass (*Oryzopsis hymenoides*) have also been sampled. Forbs are limited and provide very little cover or forage. Hoods phlox (*Phlox hoodii*) and longleaf phlox (*Phlox longifolia*) were the most abundant of the perennial forb species in 1996 and 2001, but were not sampled in 2006. This decrease may be treatment related. Alfalfa (*Medicago sativa*), which was seeded in the treatment, occurred at a relatively high frequency, and had the highest cover of all the forb species in 2006 and 2011 (Table - Herbaceous Trends).

Soil: The soil is part of the Woodpass component, which is found on upland slopes and alluvial fans. The parent material consists of alluvium derived from limestone and sandstone (Soil Survey Staff 2011). The soil texture is a sandy clay loam with a neutral soil reaction (pH 7.2) (Table - Soil Analysis Data). Exposed bare ground cover occurs in regular distribution between the interspaces of browse and perennial grass colonies; moreover, bare ground cover was moderate in quantity in all sample years. Ample protective ground cover is provided by high amounts of vegetation and litter (Table - Basic Cover). The vegetation cover has been highly moderate due to the dense stand of crested wheatgrass, but there has also been a significant amount of bare soil in all other sampling years. Cryptogams are abundant around the base of crested wheatgrass plants. Soil pedestalling provides evidence that some erosion has occurred in the past. The soil erosion condition has been classified as stable since 2001.

Trend Assessments

Browse:

- **1990 to 1996 - stable (0):** Differences in density may be related to the larger sample area used in 1996; therefore, trend was determined using other parameters. Decadence within the Wyoming big sagebrush population decreased noticeably from 31% to 6%. Poor vigor was not observed within the sagebrush population. Young sagebrush plants were not observed.
- **1996 to 2001 - slightly up (+1):** The density for Wyoming big sagebrush increased 31% from 320 plants/acre to 420 plants/acre. Decadence and poor vigor were not observed within the sagebrush population. Recruitment of young sagebrush plants increased to 24% of the population.
- **2001 to 2006 - slightly up (+1):** The density for Wyoming big sagebrush increased 48% to 620 plants/acre. It appears the seeding treatment from 2003 has increased sagebrush density. The increase in density was primarily due to an increase in young sagebrush plants, which comprised 42% of the population. Decadence and poor vigor were not observed within the sagebrush population. Fourwing saltbush was encountered for the first time with a density of 460 plants/acre. Decadence and poor vigor within the saltbush population was not observed.
- **2006 to 2011 - stable (0):** The density for Wyoming big sagebrush decreased 23% to 480 plants/acre. The decrease in density is primarily due to decreases in the recruitment of young sagebrush plants, which comprised 25% of the population. It appears that many of the young plants from 2006 did not establish in the population since the density of mature sagebrush plants remained similar. Decadence and poor vigor comprised 4% of the population. The density of fourwing saltbush decreased in density to 480 plants/acre. Decadence within the saltbush population remained similar at 4%

Grass:

- **1990 to 1996 - stable (0):** The sum of nested frequency for perennial grasses had no change. The perennial species crested wheatgrass was very prolific, and had a cover of 23%.
- **1996 to 2001 - stable (0):** The sum of nested frequency for perennial grasses remained similar. Crested wheatgrass had no significant change in nested frequency, but increased in cover to 31%.
- **2001 to 2006 - down (-2):** The sum of nested frequency for perennial grasses decreased 21%. Crested wheatgrass decreased significantly in nested frequency, and decreased in cover to 23%. Orchardgrass (*Dactylis glomerata*) increased significantly in nested frequency, and had a cover of less than 1%. Sandberg bluegrass decreased significantly in nested frequency, and decreased in cover to less than 1%.
- **2006 to 2011 - slightly up (+1):** The sum of nested frequency for perennial grasses increased 12%. Crested wheatgrass, thickspike wheatgrass (*Agropyron dasystachyum*), and Indian ricegrass increased significantly in nested frequency. Crested wheatgrass increased in cover to 42%. The remaining species had covers of less than 1%.

Forb:

- **1990 to 1996 - down (-2):** The sum of nested frequency for perennial forbs decreased 53%. Hoods phlox and longleaf phlox decreased significantly in nested frequency. Forbs were uncommon and were not diverse.
- **1996 to 2001 - slightly up (+1):** The sum of nested frequency for perennial forbs increased 60%, but remained relatively rare on the site. Longleaf phlox and clover (*Trifolium sp.*) increased significantly in nested frequency. No one perennial forb species had a cover above a 1%.
- **2001 to 2006 - slightly up (+1):** The sum of nested frequency for perennial forbs increased 24%, but cover remained relatively rare on the site. Cover of perennial forbs increased from 1% to 2%. Hoods phlox, longleaf phlox, and clover decreased significantly in nested frequency. The seeded species Alfalfa (*Medicago sativa*) had a significant increase in nested frequency, and had a cover of 2%. The seeded species blue flax (*Linum perenne*) increased significantly in nested frequency, and had a cover of less than 1%.

- **2006 to 2011 - slightly down (-1):** The sum of nested frequency for perennial forbs decreased 20%, but forbs were already relatively rare on the site. Alfalfa did not have a significant increase in nested frequency, but increased considerably in cover to 5%. Blue flax decreased significantly in nested frequency. The annual species pale alyssum (*Alyssum alyssoides*) had a significant increase in nested frequency, and was the most common forb species on the site.

DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --

Management unit 2, study no: 36

Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
96	1.1	0.0	0.0	30.0	0.0	2.4	0.0	33.5	Fair
01	1.9	0.0	0.0	30.0	0.0	1.7	0.0	33.6	Fair
06	1.1	0.0	0.0	30.0	0.0	3.7	0.0	34.8	Fair
11	2.0	0.0	0.0	30.0	0.0	10.0	0.0	42.0	Fair

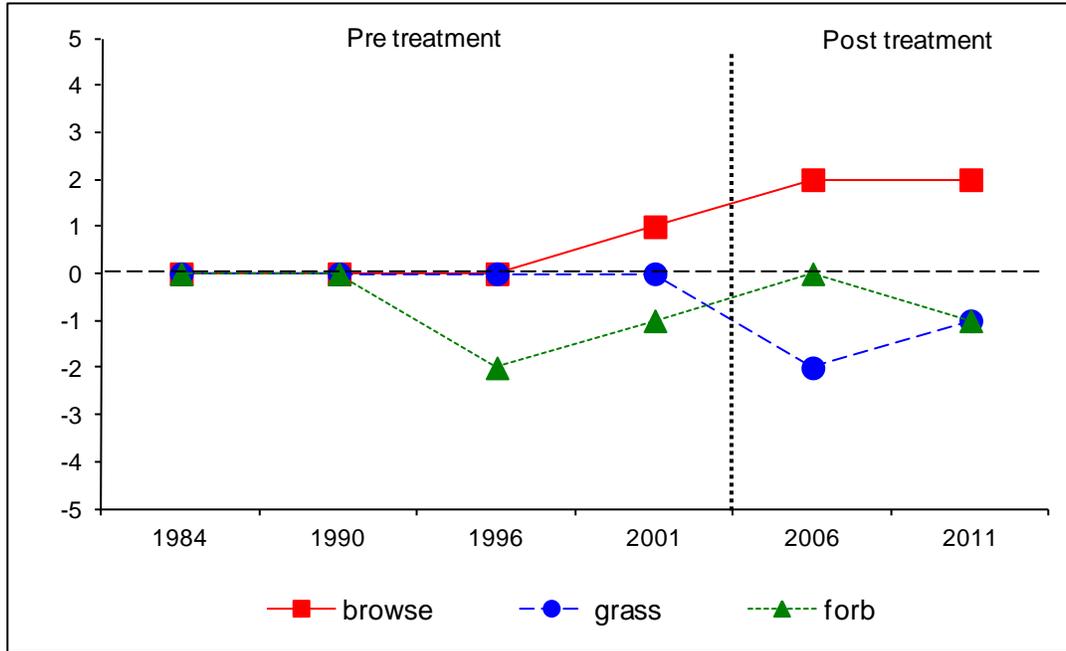
SEED MIX--

Management unit 02, Study no: 36

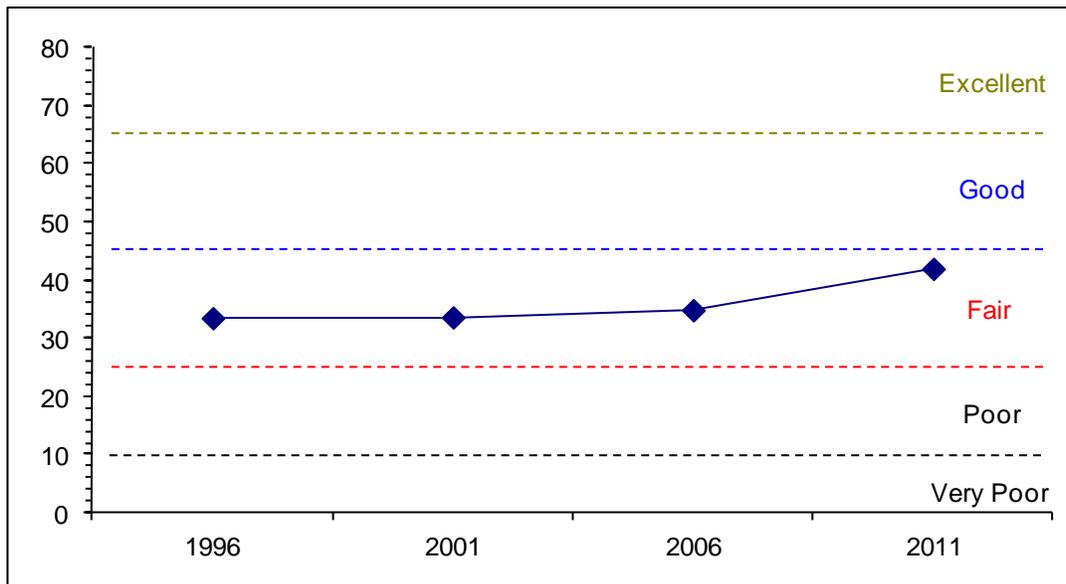
Project Name: Woodruff Co-op WMA			
Application: Disk and Seed		Acres: 173	
Seed Type	lbs in mix	lbs/acre	
G	Bluebunch Wheatgrass 'Goldar'	100	0.58
G	Great Basin Wildrye 'Trailhead'	121	0.70
G	Indian Ricegrass 'Rimrock'	100	0.58
G	Orchardgrass Paiute '	100	0.58
G	Russian Wildrye 'Bozoisky'	175	1.01
G	Thickspike Wheatgrass 'Critana'	100	0.58
F	Alfalfa 'Ranger'	250	1.45
F	Blue Flax 'Appar'	25	0.14
F	Cicer Milkvetch	150	0.87
F	Sainfoin 'Remont'	100	0.58
F	Small Burnet	250	1.45
F	Yellow Sweetclover	50	0.29
B	Fourwing Saltbush	200	1.16
B	Sagebrush, Wyoming	35	0.20
Total Pounds:		1756	10.15

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 2, Study no: 36



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE--
 Management unit 2, Study no: 36



HERBACEOUS TRENDS--
Management unit 02, Study no: 36

Type	Species	Nested Frequency					Average Cover %			
		'90	'96	'01	'06	'11	'96	'01	'06	'11
G	Agropyron cristatum	b348	b360	b344	a293	b350	22.46	30.84	22.66	41.90
G	Agropyron dasystachyum	a-	a-	a-	a-	b10	-	-	-	.06
G	Agropyron spicatum	-	-	-	1	4	-	-	.15	.15
G	Bromus tectorum (a)	-	-	-	5	6	-	-	.03	.01
G	Dactylis glomerata	a-	a-	a-	b15	a1	-	-	.19	.03
G	Elymus junceus	-	-	-	-	4	-	-	-	.09
G	Oryzopsis hymenoides	a5	a-	a4	ab19	b34	-	.03	.48	.40
G	Poa secunda	b89	b90	b99	a36	a9	1.38	1.44	.35	.02
G	Stipa comata	ab11	a1	b24	ab6	a1	.03	.45	.09	.00
Total for Annual Grasses		0	0	0	5	6	0	0	0.03	0.00
Total for Perennial Grasses		453	451	471	370	413	23.88	32.77	23.92	42.67
Total for Grasses		453	451	471	375	419	23.88	32.77	23.96	42.68
F	Alyssum alyssoides (a)	-	a41	b159	b123	c265	.10	.40	.97	2.41
F	Antennaria sp.	-	2	-	-	-	.00	-	-	-
F	Astragalus convallarius	-	-	4	-	1	-	.06	-	.00
F	Astragalus sp.	-	-	-	9	1	-	-	.05	.00
F	Astragalus utahensis	7	-	3	2	-	-	.03	.03	-
F	Lappula occidentalis (a)	-	-	-	-	1	-	-	-	.00
F	Linum perenne	a-	a-	a-	c33	b11	-	-	.22	.07
F	Lomatium sp.	-	-	-	-	1	-	-	-	.00
F	Medicago sativa	a-	a-	a-	b112	b104	-	-	1.50	5.05
F	Phlox hoodii	c83	b43	b33	a-	a-	1.10	.41	-	-
F	Phlox longifolia	c81	b37	c70	a-	a3	.08	.24	-	.00
F	Sanguisorba minor	-	-	-	5	-	-	-	.01	-
F	Schoenrambe linifolia	-	3	-	-	-	.00	-	-	-
F	Tragopogon dubius (a)	-	3	8	-	-	.00	.06	-	-
F	Trifolium sp.	b11	a-	c26	b8	bc14	-	.11	.02	.06
Total for Annual Forbs		0	44	167	123	266	0.10	0.47	0.97	2.41
Total for Perennial Forbs		182	85	136	169	135	1.19	0.86	1.86	5.21
Total for Forbs		182	129	303	292	401	1.30	1.33	2.83	7.63

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

BROWSE TRENDS--

Management unit 02, Study no: 36

Type	Species	Strip Frequency				Average Cover %			
		'96	'01	'06	'11	'96	'01	'06	'11
B	Artemisia tridentata wyomingensis	14	16	22	19	.28	.96	.24	.39
B	Atriplex canescens	0	0	19	16	-	-	.52	1.17
B	Ceratoides lanata	40	42	1	1	.59	.53	-	.00
B	Chrysothamnus nauseosus consimilis	0	1	0	0	-	-	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	33	34	2	2	.26	.75	.06	.06
B	Gutierrezia sarothrae	5	7	0	1	.03	.33	-	-
B	Opuntia polyacantha	12	11	4	5	.18	.34	-	-
B	Tetradymia canescens	8	3	3	8	.06	-	.00	.06
Total for Browse		112	114	51	52	1.41	2.92	0.82	1.69

CANOPY COVER, LINE INTERCEPT--

Management unit 02, Study no: 36

Species	Percent Cover	
	'06	'11
Artemisia tridentata wyomingensis	.16	.26
Atriplex canescens	.58	1.33
Ceratoides lanata	-	.51
Opuntia polyacantha	-	.06
Tetradymia canescens	-	-

KEY BROWSE ANNUAL LEADER GROWTH--

Management unit 02, Study no: 36

Species	Average leader growth (in)		
	'01	'06	'11
Artemisia tridentata wyomingensis	1.1	0.9	1.5
Atriplex canescens	-	2.2	9.7
Ceratoides lanata	5	-	7.4

BASIC COVER--

Management unit 02, Study no: 36

Cover Type	Average Cover %				
	'90	'96	'01	'06	'11
Vegetation	16.75	28.00	39.97	27.23	49.97
Rock	1.75	2.09	1.01	2.54	.96
Pavement	1.25	3.02	1.88	1.97	3.69
Litter	36.50	34.31	44.11	42.73	34.44
Cryptogams	.50	.28	2.07	0	.30
Bare Ground	43.25	26.78	36.09	39.20	23.62

SOIL ANALYSIS DATA --

Management unit 02, Study no: 36, Study Name: Woodruff Co-op

Effective rooting depth (in)	pH	Sandy Clay Loam			%OM	PPM P	PPM K	ds/m
		% sand	% silt	% clay				
13.2	7.2	56.6	14.1	29.4	2.1	3.9	108.8	0.7

PELLET GROUP DATA--

Management unit 02, Study no: 36

Type	Quadrat Frequency				Days use per acre (ha)		
	'96	'01	'06	'11	'01	'06	'11
Rabbit	10	7	76	7	-	-	-
Elk	-	-	1	3	3 (7)	7 (17)	-
Deer/Pronghorn	12	6	9	16	7 (18)	13 (31)	36 (89)
Cattle	15	19	4	7	41 (102)	17 (43)	-

BROWSE CHARACTERISTICS--

Management unit 02, Study no: 36

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization			Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy	% poor vigor	
<i>Artemisia tridentata wyomingensis</i>									
90	964	10	59	31	-	62	3	0	10/16
96	320	0	94	6	-	31	0	0	14/24
01	420	24	76	0	20	19	0	0	18/29
06	620	42	58	0	20	26	23	0	7/8
11	480	25	71	4	-	29	63	4	7/9
<i>Atriplex canescens</i>									
90	0	0	0	-	-	0	0	0	-/-
96	0	0	0	-	-	0	0	0	-/-
01	0	0	0	-	-	0	0	0	-/-
06	460	39	61	-	20	22	9	0	16/16
11	440	5	95	-	-	27	0	0	20/22
<i>Atriplex gardneri falcate</i>									
90	33	0	100	-	-	0	0	0	5/5
96	0	0	0	-	-	0	0	0	-/-
01	0	0	0	-	-	0	0	0	-/-
06	0	0	0	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	-/-
<i>Ceratoides lanata</i>									
90	332	30	70	0	-	40	0	0	7/5
96	2660	11	87	2	-	48	35	0	7/9
01	2500	10	90	0	-	54	.80	0	8/9
06	20	0	100	0	-	100	0	0	4/7
11	20	0	100	0	-	0	0	0	10/12

Year	Plants per Acre (excluding seedlings)	Age class distribution			Seedling (plants/acre)	Utilization		% poor vigor	Average Height Crown (in)
		% Young	% Mature	% Decadent		% moderate	% heavy		
<i>Chrysothamnus nauseosus consimilis</i>									
90	0	0	0	-	-	0	0	0	-/-
96	0	0	0	-	-	0	0	0	-/-
01	40	0	100	-	-	100	0	0	-/-
06	0	0	0	-	-	0	0	0	-/-
11	0	0	0	-	-	0	0	0	-/-
<i>Chrysothamnus viscidiflorus viscidiflorus</i>									
90	1498	24	60	16	-	53	0	0	4/6
96	880	0	91	9	-	0	0	7	7/11
01	1060	0	98	2	-	0	0	0	7/11
06	40	0	100	0	-	100	0	0	5/10
11	40	0	100	0	-	0	0	0	7/10
<i>Gutierrezia sarothrae</i>									
90	0	0	0	-	-	0	0	0	-/-
96	120	0	100	-	-	0	0	0	5/7
01	220	0	100	-	-	0	0	0	7/12
06	0	0	0	-	-	0	0	0	5/10
11	20	0	100	-	-	0	0	0	7/9
<i>Opuntia polyacnatha</i>									
90	265	25	75	0	-	0	0	13	4/6
96	280	7	71	21	-	0	0	14	4/12
01	420	5	95	0	20	0	0	0	3/9
06	80	25	75	0	-	0	0	0	3/4
11	100	0	100	0	-	0	0	0	3/5
<i>Tetradymia canescens</i>									
90	0	0	0	0	-	0	0	0	-/-
96	200	0	90	10	-	40	10	0	5/9
01	60	0	100	0	-	0	0	0	5/13
06	80	0	100	0	20	25	75	0	5/10
11	180	0	100	0	-	0	0	0	11/14