

Trend Study 16B-17-04

Study site name: Slackpile .

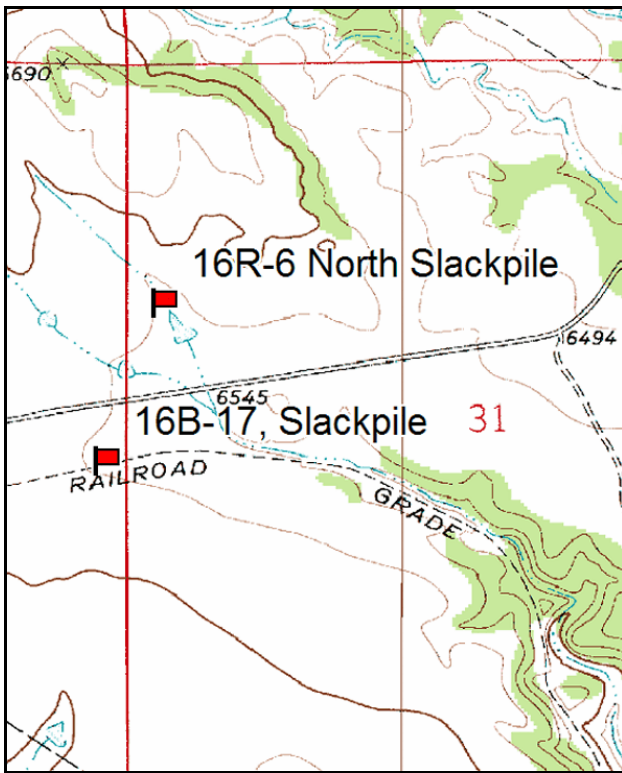
Vegetation type: Wyoming Big Sagebrush .

Compass bearing: frequency baseline 165 degrees magnetic- Line 1 & 2; 163 degrees magnetic- Line 3 & 4.

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

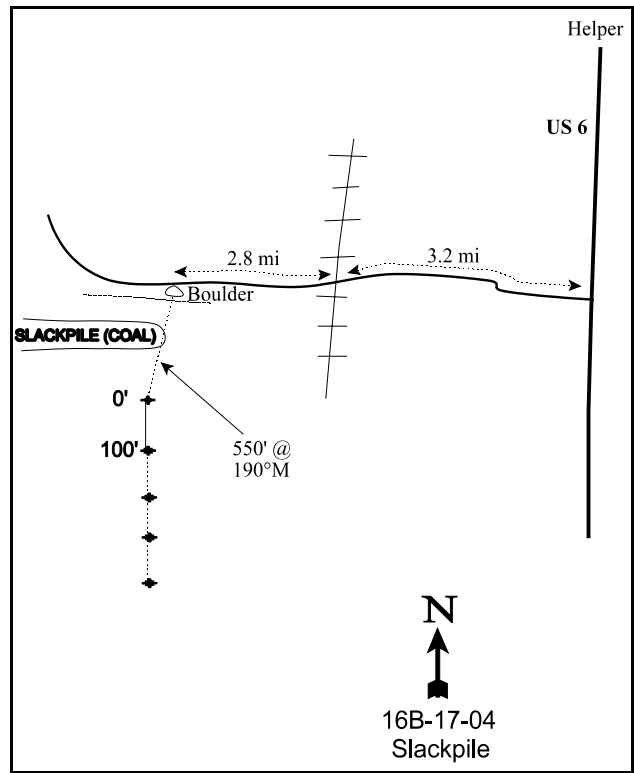
LOCATION DESCRIPTION

On US 6 south of Helper, turn west onto Consumers Road. Proceed west 3.2 miles to the railroad tracks. Cross the tracks and continue 2.8 miles to a large boulder on the left. The study is located in the sagebrush south of the fence. Walk 550 feet at 190°M from the boulder to the start of the frequency baseline. The first stake is marked with a red browse tag, #9022.



Map Name: Standardville

Township 13S , Range 8E , Section 36



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4388792 N, 502890 E

## DISCUSSION

### Slackpile - Trend Study No. 16B-17

The Slackpile study samples a representative sagebrush-grass site owned by the Utah Division of Wildlife. The study is at an elevation of 6,600 feet on an 8% north-facing slope. The sagebrush-grass type covers an extensive part of the Gordon Creek range, an important wintering area for large numbers of deer. The Division allows spring cattle grazing on two pastures, one south of Consumers road and another north of the road. Each pasture is grazed every other year. North Slackpile (16R-6) was established to monitor the north pasture, while this site monitors the south pasture. Cattle were on the site when it was read in May of 1999 and in 2004. Pellet group transects estimated livestock use was moderate in 1999 with 23 cow days use/acre (57 cdu/ha). By May 18, 2004, cattle use was estimated to be 7 cow days use/acre (18 cdu/ha) and cows were still using the site. Deer use was estimated at 65 deer days use/acre (160 ddu/ha) in 1999 and 52 deer days use/acre (139 ddu/ha) in 2004.

Soil texture is a loam with a slightly alkaline pH (7.5). Phosphorus (5.1 ppm) and potassium (44.8 ppm) are lower than the 10 ppm and 70 ppm that may be necessary for normal plant development and growth. The soil is moderately deep with an estimated effective rooting depth of 18 inches. There are very few rocks or pavement on the surface or throughout the profile. There is a considerable amount of bare ground on the site. In 1999, bare ground was estimated at 43% and increased to 62% in 2004, which was greater than protective cover at only 48% (vegetation, litter, cryptogams). Cryptogams decreased from 10% cover in 1999 to just over 1% in 2004. It was reported in 1999 that the soil surface was very hard with a crust present, but in 2004 the soil was soft and easily disturbed. Pedestaling is present around the baseline stakes and shrub stems. Exposed roots and small gullies indicate some erosion problems on the site. An erosion class assessment rated erosion as slight in 2004.

The key browse species for Slackpile is Wyoming big sagebrush. Density for Wyoming big sagebrush was stable from 1988 to 1999 at about 2,800 plants/acre. This area has experienced drought conditions from 2001-2003. Annual precipitation has only been 48-60% of average during this time. Spring conditions (April-June) have been very dry and were only 13% of normal in 2002. Due to this drought, sagebrush density decreased by 4-fold to 660 plants per acre in 2004. Percent decadence varied from 36 to 57% between 1988 and 1999, but in 2004 decadence was at 88% and 67% of the population was classified as dying. Sagebrush cover decreased from 7.6% in 1999 to 1.5% in 2004. In 1999, sagebrush made up 45% of total browse cover. This declined to 25% of total browse cover in 2004. Utilization was consistent from 1988-2004 with typically moderate to heavy use. In 1999, 31% were classified with moderate use and 42% with heavy use. Utilization was similar in 2004, with 39% moderate use and 45% heavy use. Recruitment was low, with only 3% of population consisting of young plants. The spring of 2004 was conducive to sagebrush seedlings with an estimated count of 6,440 plants/acre. It remains to be seen if these plants will be recruited into the population. Black sagebrush has also been identified on this site, but in low numbers. Stickyleaf low rabbitbrush is the most abundant shrub in both cover and density and was estimated at 4,820 plants/acre in 2004, which was 4 times lower than the 1999 estimate of 19,040 plants/acre. Cover decreased from 8.4% in 1999 to 3.9% in 2004. Rabbitbrush made up 68% of the total browse cover in 2004, up from 51% in 1994 and 49% in 1999. There was little to no use in 2004. Seedlings were very abundant in 2004 and estimated at 133,300 per acre.

Species richness of herbaceous vegetation is average for this range type with 7 grass and 7 forb species identified in 1994. The number of herbaceous species sampled in 1999 increased, with 7 grasses and 17 forbs present. In 2004, 6 grasses and 21 forbs were sampled. Most of the increase in forbs comes from species infrequently encountered. Bluebunch wheatgrass and blue grama are the most common grasses. Bluebunch wheatgrass was only sampled in 45% of quadrats in 2004, which was significantly lower than 87% in 1999 and 70% in 1994. Cover decreased from 8.9% in 1999 to 1.5% in 2004. Bluebunch wheatgrass made up 76% of total grass cover in 1999 and was only 35% of the total grass cover in 2004. The decline of this cool season

grass can be attributed to drought and spring grazing. Bluebunch wheatgrass was heavily grazed at the time of sampling in May of 2004. The warm season grass Blue grama has remained stable over the past 10 years. Cover had increased to 2% in 2004, which makes up 48% of the total grass cover. Cover for Indian ricegrass has decreased to only 0.3% in 2004, but many seedlings were encountered. Nested frequency for all perennial grasses combined has decreased each time this site has been sampled. Nested frequency for both annual and perennial forbs has increased since 1999. Total cover for forbs was three times higher in 2004. Cover for Scarlet globemallow increased from 0.2% in 1999 to 1.9% in 2004. Sego lily significantly increased in 2004. It had only been encountered in 10% of quadrats in 1999 and was up to 40% in 2004. Longleaf phlox and hollyleaf clover were also fairly abundant.

#### 2004 Comparison to North Slackpile 16R-6

The goal of the spring grazing on these pastures is to favor browse which is important for wintering deer. Both pastures experienced the sagebrush die-off that has effected the area. The North Slackpile study in the north pasture has a slightly higher density and cover of sagebrush than Slackpile (16B-17) in the south pasture. Sagebrush cover for North Slackpile was 3.0%, while it was only 1.5% at Slackpile. Slackpile had less grass also. Sum of nested frequency for all perennial grasses was lower for Slackpile (228) than for North Slackpile (341). Cover of perennial grasses was about 12% for the north compared to only 4% for the south, which may be low because of grazing when the site was monitored. Slackpile actually had a more cool season grasses (nested freq of cool season was 198 compared to 101 for North Slackpile) than the north pasture did. Grass for North Slackpile was mostly made up of the warm season blue grama, which made up 87% of the total grass cover.

#### 1994 TREND ASSESSMENT

Protective ground cover has increased since 1988, with bare ground now covering 40% of the ground surface. Percent litter and cryptogamic cover have declined somewhat but vegetative cover appears to have increased. Fifty-one percent of that cover comes from herbaceous vegetation which is best at holding soil in place. There is still a considerable amount of exposed soil and some signs of soil movement, but it does not appear to be severe. Trend for soil is therefore improving.

Browse trend is slightly down. The key species on this site is Wyoming big sagebrush. Population density for sagebrush is currently stable with light to moderate use and good vigor. Biotic and reproductive potentials are low and decadency has increased from 42% to 57%. The number of dead plants was estimated at 1,580 plants/acre in 1994, a very high number. The main negative aspect of this site is the extremely high number of small rabbitbrush (12,620 plants/acre). Currently, the population is mostly mature with few young and decadent. This shrub will replace Wyoming big sagebrush if current trends continue. The only positive aspect of the browse trend on this site is the 90% reduction in broom snakeweed density (13,398 to 1,400 plants/acre). Broom snakeweed is a short-lived shrub which commonly dies off in large numbers during extended drought.

Sum of nested frequency for perennial grasses have declined slightly since the last reading, while those of the perennial forbs have declined 50%. The native, bluebunch wheatgrass, increased significantly, nested frequency increased by about 66%. All other grasses encountered in 1988, declined significantly in nested frequency. The sum of nested frequency for grasses and forbs combined declined. Trend for grasses is stable, while those for forbs is down. The Desirable Components Index (see methods) rating is fair at 40 for a Wyoming big sagebrush community. Percent decadence is poor and the amount of young sagebrush plants is low. Perennial grasses are abundant.

#### TREND ASSESSMENT

soil - up slightly (4)

browse - down slightly (2)

herbaceous understory - slightly down (2)

winter range condition (DC Index) - 40 (fair) Wyoming big sagebrush type

#### 1999 TREND ASSESSMENT

Trend for soil is stable, but still in poor condition. Relative bare ground cover is the same as in 1994. The ratio of protective cover to bare soil has actually improved slightly. Bare ground cover still remains relatively high and soil movement is noticeable with pedestalling occurring around the base of shrubs. The proportion of protective ground cover (herbaceous vegetation, cryptogams, and litter) to bare ground is marginally low, indicating high amounts of exposed bare soil. Wyoming big sagebrush, the key species, has a marginally stable trend. The population density remains stable overall, although recruitment is low. Decadency decreased from 57% to 36%. However, the proportion of the population displaying heavy use increased from 7% to 42% in 1999. A negative aspect for browse on the site comes from the increase in stickyleaf low rabbitbrush, currently at 19,040 plants/acre. Any continued increase in rabbitbrush could result in deleterious effects to the key species, Wyoming big sagebrush. Trend for the herbaceous understory is stable overall. Perennial grass sum of nested frequency decreased, while perennial forb nested frequency increased. The DCI score improved to fair to good as decadence and proportion of young sagebrush plants improved.

#### TREND ASSESSMENT

soil - stable (3)

browse - stable for the key species, Wyoming big sage (3)

herbaceous understory - stable (3)

winter range condition (DC Index) - 48 (fair to good) Wyoming big sagebrush type

#### 2004 TREND ASSESSMENT

Trend for soil is slightly down. Percent relative bare ground cover increased 37%. The decline of grass and shrub cover has increased the amount of unprotected soil. Dry conditions have also reduced cryptogamic cover, which helps hold soil in place. Browse trend is down due to the dramatic decline of Wyoming big sagebrush. Density in 2004 is four times lower than 1999 and decadency of the remaining population was very high at 88%. Stickyleaf low rabbitbrush density also declined, but it is still the most dominant browse species. Herbaceous understory trend is slightly down. Nested frequency for perennial grasses is down, especially with the decline in Bluebunch wheatgrass. Cover for grasses is nearly 3 times lower than it was in 1999. Trend for forbs is slightly up as Segolily, longleaf phlox, and scarlet globemallow were found in greater abundance and increased cover. The loss of perennial grasses makes the understory trend slightly down. The die off of sagebrush and the very high decadence has caused the DCI score to decline to poor. Perennial grass cover also declined.

#### TREND ASSESSMENT

soil - slightly down (2)

browse - down (1)

herbaceous understory - down slightly (2)

winter range condition (DC Index) - 11 (poor) Wyoming big sagebrush type

HERBACEOUS TRENDS --  
Management unit 16B, Study no: 17

Type	Species	Nested Frequency				Average Cover %		
		'88	'94	'99	'04	'94	'99	'04
G	<i>Agropyron spicatum</i>	a127	b211	b235	a97	10.30	8.85	1.50
G	<i>Bouteloua gracilis</i>	a-	b37	b30	b30	1.72	1.22	2.04
G	<i>Elymus salina</i>	a-	ab17	b20	a3	.51	.87	.00
G	<i>Oryzopsis hymenoides</i>	95	81	53	81	1.77	.57	.27
G	<i>Poa fendleriana</i>	-	3	3	3	.01	.03	.00
G	<i>Sitanion hystrix</i>	b172	a26	a7	a-	.29	.04	-
G	<i>Stipa comata</i>	15	6	3	14	.06	.03	.40
Total for Annual Grasses		0	0	0	0	0	0	0
Total for Perennial Grasses		409	381	351	228	14.68	11.61	4.23
Total for Grasses		409	381	351	228	14.68	11.61	4.23
F	<i>Arabis</i> spp.	6	-	5	-	-	.01	-
F	<i>Astragalus convallarius</i>	b44	a5	b35	b48	.01	.08	.65
F	<i>Castilleja linariaefolia</i>	1	-	13	8	-	.20	.02
F	<i>Calochortus nuttallii</i>	a1	a-	b19	c82	-	.05	.30
F	<i>Chenopodium leptophyllum</i> (a)	-	a-	a-	b51	-	-	.28
F	<i>Convolvulus arvensis</i>	-	-	-	3	-	-	.00
F	<i>Collinsia parviflora</i> (a)	-	-	5	-	-	.01	-
F	<i>Descurainia pinnata</i> (a)	-	a-	a-	b13	-	-	.07
F	<i>Eriogonum cernuum</i> (a)	-	-	-	3	-	-	.01
F	<i>Eriogonum umbellatum</i>	a-	a3	b10	a3	.15	.16	.15
F	<i>Gayophytum ramosissimum</i> (a)	-	a-	a-	b46	-	-	.60
F	<i>Lappula occidentalis</i> (a)	-	-	-	5	-	-	.15
F	<i>Machaeranthera grindelioides</i>	ab9	ab10	b19	a2	.07	.07	.18
F	<i>Orthocarpus</i> spp. (a)	b46	a-	a-	a3	-	-	.01
F	<i>Penstemon caespitosus</i>	c43	b23	a-	a-	.11	-	-
F	<i>Penstemon carnosus</i>	a-	a-	a31	b17	-	.13	.12
F	<i>Phlox austromontana</i>	a3	b29	b32	a2	.36	.70	.00
F	<i>Phlox longifolia</i>	c235	ab106	a88	b131	.25	.25	.72
F	<i>Physaria</i> spp.	-	-	1	-	-	.00	-
F	<i>Polygonum douglasii</i> (a)	-	a-	a-	b80	-	-	.43
F	<i>Potentilla</i> spp.	-	-	2	-	-	.03	-
F	<i>Ranunculus testiculatus</i> (a)	-	-	-	5	-	-	.01
F	<i>Schoenocrambe linifolia</i>	-	a-	b9	ab9	-	.03	.05
F	<i>Sphaeralcea coccinea</i>	44	45	49	68	.35	.20	1.94
F	<i>Thlaspi montanum</i>	-	-	2	-	-	.00	-

Type	Species	Nested Frequency				Average Cover %		
		'88	'94	'99	'04	'94	'99	'04
F	Trifolium gymnocarpon	<sub>b</sub> 59	<sub>a</sub> -	<sub>b</sub> 47	<sub>b</sub> 64	-	.24	.86
F	Zigadenus paniculatus	-	-	-	7	-	-	.02
Total for Annual Forbs		46	0	5	206	0	0.01	1.57
Total for Perennial Forbs		445	221	362	444	1.31	2.19	5.04
Total for Forbs		491	221	367	650	1.31	2.21	6.62

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

#### BROWSE TRENDS --

Management unit 16B, Study no: 17

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Artemisia nova	4	3	2	.76	.38	-
B	Artemisia tridentata wyomingensis	74	73	25	5.03	7.57	1.45
B	Chrysothamnus viscidiflorus viscidiflorus	90	95	76	6.42	8.37	3.90
B	Echinocereus spp.	0	3	0	-	.00	-
B	Gutierrezia sarothrae	42	27	7	.17	.30	.03
B	Opuntia spp.	17	19	15	.22	.37	.39
B	Pediocactus simpsonii	0	0	1	-	-	-
B	Pinus edulis	0	0	0	.00	-	-
B	Sclerocactus	0	1	0	-	-	-
Total for Browse		227	221	126	12.63	17.00	5.79

#### CANOPY COVER, LINE INTERCEPT --

Management unit 16B, Study no: 17

Species	Percent Cover
	'04
Artemisia tridentata wyomingensis	.76
Chrysothamnus viscidiflorus viscidiflorus	3.01

KEY BROWSE ANNUAL LEADER GROWTH --  
Management unit 16B, Study no: 17

Species	Average leader growth (in)
	'04
Artemisia tridentata wyomingensis	2.9

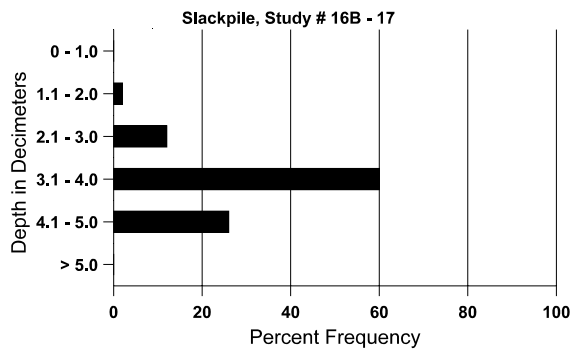
BASIC COVER --  
Management unit 16B, Study no: 17

Cover Type	Average Cover %			
	'88	'94	'99	'04
Vegetation	4.50	28.70	30.32	17.02
Rock	0	.06	.00	.04
Pavement	.50	.09	.01	.19
Litter	29.25	25.67	21.25	29.62
Cryptogams	10.00	2.78	9.93	1.43
Bare Ground	55.75	40.50	42.94	62.46

SOIL ANALYSIS DATA --  
Management unit 16B, Study no: 17, Study Name: Slackpile

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m
18.0	59.0 (17.3)	7.5	39.3	34.2	26.6	1.5	5.1	44.8	0.6

### Stoniness Index



PELLET GROUP DATA --

Management unit 16B, Study no: 17

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	8	54	25
Elk	4	2	-
Deer	48	59	61
Cattle	1	6	2

Days use per acre (ha)	
'99	'04
-	-
-	-
65 (160)	52 (139)
23 (57)	7 (18)

BROWSE CHARACTERISTICS --

Management unit 16B, Study no: 17

		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 nova</i>												
88	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
94	<b>160</b>	-	40	80	40	-	50	0	25	13	13	16/34
99	<b>220</b>	-	-	180	40	-	27	64	18	-	0	7/14
04	<b>80</b>	-	-	-	80	60	0	0	100	25	25	9/15
<i>Artemisia tridentata wyomingensis</i>												
88	<b>2999</b>	200	800	933	1266	-	40	44	42	-	4	13/18
94	<b>2800</b>	-	60	1140	1600	1580	52	7	57	11	13	16/23
99	<b>2800</b>	-	240	1540	1020	1940	31	42	36	10	10	18/27
04	<b>660</b>	6440	20	60	580	4400	39	45	88	67	67	18/21
<i>Atriplex canescens</i>												
88	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
94	<b>0</b>	-	-	-	-	-	0	0	-	-	0	14/47
99	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
04	<b>0</b>	-	-	-	-	-	0	0	-	-	0	37/24
<i>Ceratoides lanata</i>												
88	<b>66</b>	66	66	-	-	-	100	0	-	-	0	-/-
94	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
99	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
04	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
<i>Chrysothamnus viscidiflorus viscidiflorus</i>												
88	<b>53799</b>	2000	44266	9400	133	-	3	.12	0	-	0	6/9
94	<b>12620</b>	-	400	12200	20	20	0	0	0	.15	.15	5/12
99	<b>19040</b>	560	3460	15500	80	120	23	6	0	.31	.31	4/9
04	<b>4820</b>	133300	620	4180	20	1800	2	.82	0	.41	.41	7/9

		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>Echinocereus</i> spp.												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
94	0	-	-	-	-	-	0	0	-	-	0	-/-
99	60	-	-	60	-	-	0	0	-	-	0	2/4
04	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Gutierrezia sarothrae</i>												
88	13398	133	2466	10466	466	-	0	0	3	.14	.99	7/7
94	1400	-	-	1400	-	60	0	0	0	-	0	8/5
99	2000	-	20	1980	-	-	0	0	0	-	0	4/3
04	280	-	-	280	-	20	0	0	0	-	0	6/6
<i>Opuntia</i> spp.												
88	399	66	266	133	-	-	0	0	0	-	33	3/7
94	440	-	-	440	-	20	0	0	0	-	0	4/13
99	540	20	100	320	120	-	0	4	22	19	19	3/13
04	520	40	60	440	20	20	0	0	4	4	4	4/9
<i>Pediocactus simpsonii</i>												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
94	0	-	-	-	-	-	0	0	-	-	0	-/-
99	0	-	-	-	-	-	0	0	-	-	0	-/-
04	20	-	-	20	-	-	0	0	-	-	0	2/2
<i>Pinus edulis</i>												
88	0	66	-	-	-	-	0	0	-	-	0	-/-
94	0	-	-	-	-	-	0	0	-	-	0	-/-
99	0	-	-	-	-	-	0	0	-	-	0	-/-
04	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Sclerocactus</i>												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
94	0	-	-	-	-	-	0	0	-	-	0	-/-
99	20	-	-	20	-	-	0	0	-	-	0	-/-
04	0	-	-	-	-	-	0	0	-	-	0	-/-