

MUDDY CREEK - TREND STUDY NO. 16C-32-09

Vegetation Type: Mountain Big Sagebrush

Range Type: Crucial Deer Winter, Substantial Elk Winter

NRCS Ecological Site Description: Not Available

Land Ownership: USFS

Elevation: 6,600 ft (2,012 m)

Aspect: South

Slope: 1%

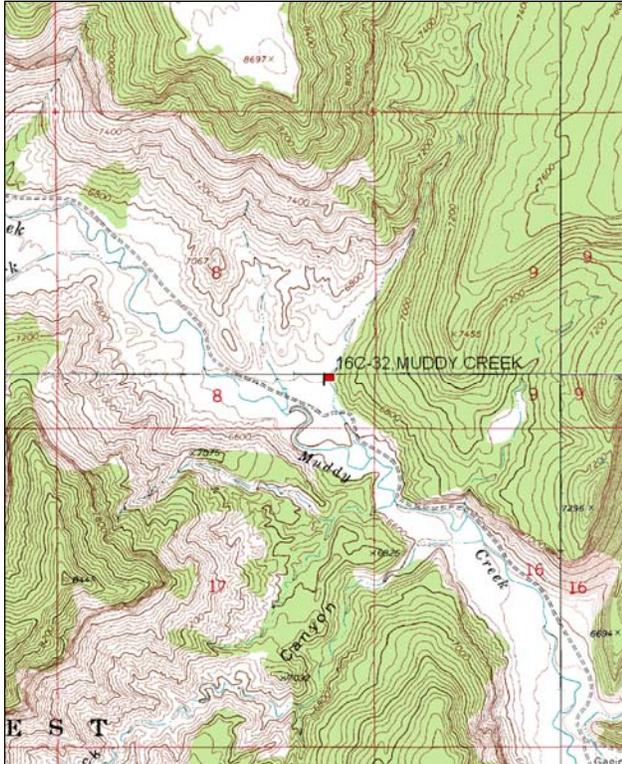
Transect bearing: line 1, 162°M, lines 2-4, 168°M

Belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft); belt 2 rebar @ 1'

Directions:

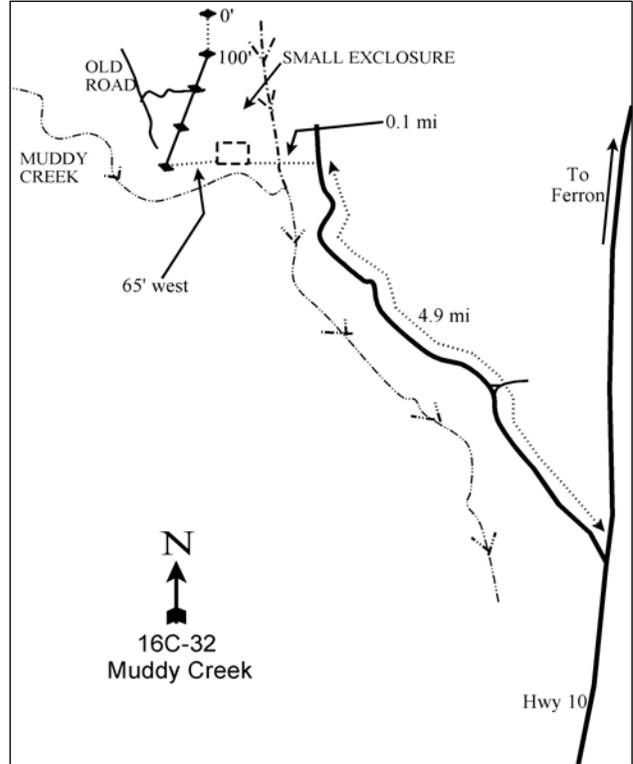
From Ferron, proceed south on Highway U-10 for 12 miles to the turnoff to Muddy Creek, which is just across from the southern Moore Road. Turn right and go 4.9 miles. Once you reach Muddy Creek, take a left across the creek for 0.1 miles to the site. From the small fenced enclosure, the 400-foot baseline stake is 65 feet west of the SW corner of the enclosure. The baseline start 400 feet north of this stake, and the 18 inch green fencepost marking the 0-foot end of the baseline has a red browse tag, #9029, attached.

Map Name: Emery West



Township: 21S, Range: 6E, Section: 17

Diagrammatic Sketch:



GPS: NAD 83, UTM 12S 477093 E 4316751 N

MUDDY CREEK - TREND STUDY NO. 16C-32

Site Information

Site Description: The study samples a unique area within the Muddy Creek drainage. A small flat (approximately 30 acres) in the bottom of the canyon supports a stand of Wyoming big sagebrush (*Artemisia tridentata* spp. *wyomingensis*) mixed with more typical desert shrubs. Large basin big sagebrush (*Artemisia tridentata* spp. *tridentata*) plants grow in the riparian areas, while pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) woodland, and mountain mahogany (*Cercocarpus* spp.) dominate the surrounding slopes. The study site is adjacent to a small Forest Service exclosure. The flat is heavily used by deer and elk and to a lesser extent, trespass cattle from private land below the Forest Service fence. Pellet group data has estimated heavy use by elk and light use by deer and cattle since 1999 (Table - Pellet Group Data).

Browse: The site is dominated by salt desert shrubs, but Wyoming big sagebrush is the preferred browse species in this area. There was a large die-off of Wyoming big sagebrush between the 1999 and 2004 sample years that is attributed to drier than normal years prior to the 2004 sample year. The Wyoming big sagebrush population had recovered somewhat by 2009, but was comprised primarily of young and decadent plants. Wyoming big sagebrush plants have displayed heavy use since 1999. After the sagebrush die-off, shadscale (*Atriplex confertifolia*) became the dominant browse species on the site. This spiny plant shows light hedging with good vigor, low decadence, and good recruitment. Bud sagebrush (*Artemisia spinescens*) was fairly common in 1988, 1994 and 2009, but was not encountered in 1999 and 2004. Use is difficult to determine on these small prostrate shrubs and most were classified as lightly hedged. Low rabbitbrush (*Chrysothamnus viscidiflorus*) is very common and has fluctuated in density over the sample years. These shrubs are small and generally not utilized as forage. Other shrubs encountered on the site include a small number of winterfat (*Ceratoides lanata*), broom snakeweed (*Gutierrezia sarothrae*), greasewood (*Sarcobatus vermiculatus*), and spiny horsebrush (*Tetradymia spinosa*) (Table - Browse Characteristics).

Herbaceous Understory: The herbaceous understory is typical for a mixed salt desert shrub community with limited diversity and moderate abundance. Indian ricegrass (*Oryzopsis hymenoides*) is the dominant grass species, but blue grama (*Bouteloua gracilis*) and bottlebrush squirreltail (*Sitanion hystrix*) are also common. Forbs are rare and provide little cover. The only common forbs have been annual species in the past, but no forb species was common in 2009 (Table - Herbaceous Trends).

Soil: Soil texture is a sandy clay loam with a slightly alkaline pH. Phosphorus has a limited availability for plant growth and development at 5.9 ppm (Tiedemann and Lopez 2004). Organic matter was the lowest of all sites within this management unit (Table - Soil Analysis Data). Bare ground is very high on the site with little protective cover (Table - Basic Cover). Numerous gullies flow from the flat into the deeply cut washes surrounding the site. Even with the level terrain, there is obvious erosion, pedestaled plants, and large bare areas. Much of the soil on the site has eroded away. Pedestaling between plants has varied from 2 to 8 inches in height. The soil erosion condition was classified as moderate in 2004 and 2009.

Trend Assessments

Browse:

- **1988 to 1994 - stable (0):** Differences in density may be related to the larger sample area used in 1994; therefore, trend was determined using other parameters. There was little change in the two prevalent shrubs, Wyoming big sagebrush and shadscale. Decadence of Wyoming big sagebrush did increase slightly from 14% to 25% and poor vigor increased from 0% to 10%, but decadence of shadscale decreased from 18% to 9%.
- **1994 to 1999 - slightly down (-1):** There was little change in the density of Wyoming big sagebrush, but decadence increased to 50%. The density of shadscale decreased by 22% and decadence increased to 20%.

- **1999 to 2004 - down (-2):** The density of Wyoming big sagebrush decreased from 3,200 plants/acre to 400 plants/acre and cover decreased from 5% to less than 1%. Decadence of Wyoming big sagebrush increased to 90% of the population and poor vigor increased from 12% to 70%. There was no new recruitment of young Wyoming big sagebrush plants sampled.
- **2004 to 2009 - up (+2):** There was nearly a three-fold increase in the density of Wyoming big sagebrush to 1,500 plants/acre, though cover is still less than 1%. Most of the increase in density is due to a large increase in the recruitment of young sagebrush plants. The proportion of decadent Wyoming big sagebrush plants decreased substantially, but the actual density of decadent plants remained similar.

Grass:

- **1988 to 1994 - up (+2):** Perennial grass sum of nested frequency increased by 21% with a significant increase in the nested frequency of blue grama and Indian ricegrass. Bottlebrush squirreltail decreased significantly in nested frequency.
- **1994 to 1999 - slightly up (+1):** The sum of nested frequency of perennial grasses increased by 10% and cover increased from 5% to 7%.
- **1999 to 2004 - slightly down (-1):** There was an 11% decrease in the sum of nested frequency of perennial grasses and cover decreased to 3%.
- **2004 to 2009 - up (+2):** Perennial grass sum of nested frequency increased by 38% and cover increased to 11%. Indian ricegrass increased significantly in nested frequency and also had a large increase in cover.

Forb:

- **1988 to 1994 - stable (0):** Perennial forb sum of nested frequency changed little.
- **1994 to 1999 - down (-2):** The sum of nested frequency of perennial forbs decreased by 58% and the sum of nested frequency of annual forbs increased substantially. Annual forbs now dominate the site.
- **1999 to 2004 - up (+2):** Perennial forb sum of nested frequency had a three-fold increase and cover increased to near 2%. Much of the increase was due to a significant increase in scarlet globemallow (*Sphaeralcea coccinea*) and hoary townsendia (*Townsendia incana*). Annual forbs continue to dominate the site.
- **2004 to 2009 - down (-2):** There was an 84% decrease in the sum of nested frequency of perennial forbs and cover decreased to 1999 levels. Annual species also decreased substantially in their sum of nested frequency and cover, and all forbs are now very rare on the site.

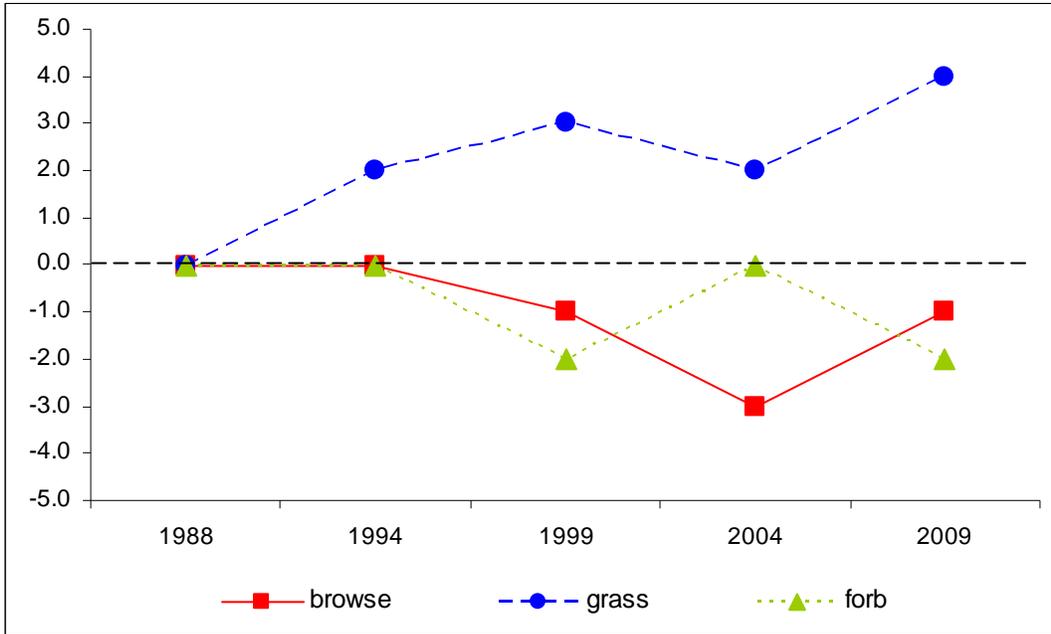
DEER DESIRABLE COMPONENTS INDEX - LOW POTENTIAL SCALE --

Management unit 16C, study no: 32

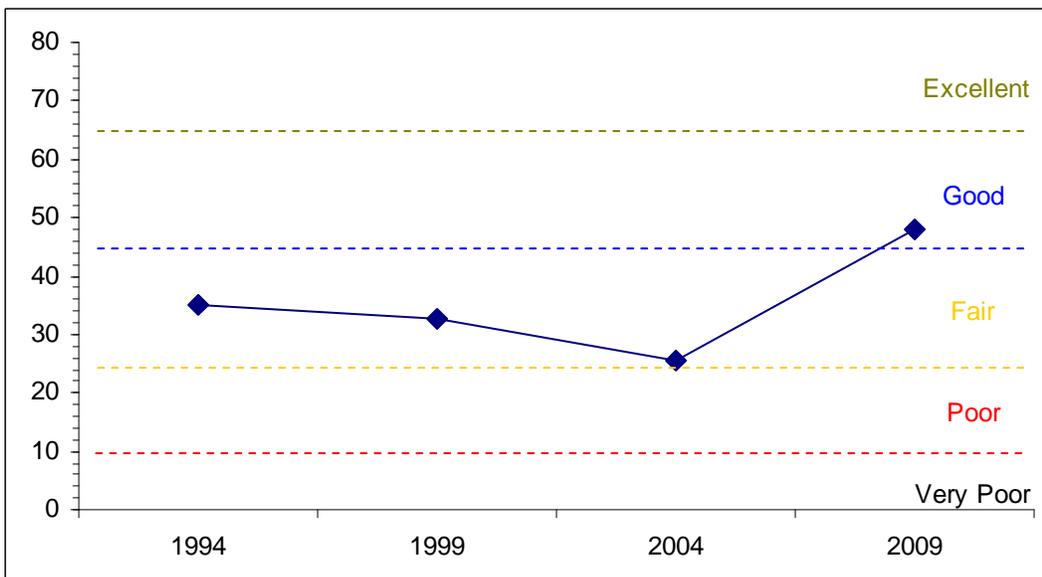
Year	Preferred Browse Cover	Preferred Browse Decadence	Preferred Browse Young	Perennial Grass Cover	Annual Grass Cover	Perennial Forb Cover	Noxious Weeds	Total Score	Ranking
94	10.1	10.4	2.9	10.7	0.0	1.1	0.0	35.2	Fair
99	9.3	3.8	5.3	13.9	0.0	0.4	0.0	32.7	Fair
04	7.4	8.3	0.9	5.2	0.0	3.9	0.0	25.7	Poor-Fair
09	6.2	10.4	9.7	21.4	0.0	0.3	0.0	47.8	Good

Trend Summary

CUMULATIVE RANGE TREND ASSESSMENT--
 Management unit 16C Study no: 32



DEER DESIRABLE COMPONENTS INDEX TREND, LOW POTENTIAL SCALE
 Management unit 16C, Study no: 32



HERBACEOUS TRENDS--

Management unit 16C, Study no: 32

Type	Species	Nested Frequency					Average Cover %			
		'88	'94	'99	'04	'09	'94	'99	'04	'09
G	Agropyron cristatum	-	-	3	1	8	-	.03	.03	.33
G	Agropyron smithii	-	-	2	-	-	-	.15	-	-
G	Agropyron spicatum inerme	-	1	-	-	-	.15	-	-	-
G	Bouteloua gracilis	a2	b36	b55	b31	b30	2.23	3.11	.28	1.02
G	Bromus tectorum (a)	-	-	10	-	4	-	.02	-	.03
G	Oryzopsis hymenoides	a64	b112	ab113	b113	c168	2.57	3.27	1.92	7.40
G	Sitanion hystrix	b94	a51	a33	a30	a45	.39	.27	.15	1.30
G	Sporobolus cryptandrus	ab5	a-	b13	b20	b18	-	.10	.21	.61
Total for Annual Grasses		0	0	10	0	4	0	0.02	0	0.03
Total for Perennial Grasses		165	200	219	195	269	5.34	6.95	2.60	10.68
Total for Grasses		165	200	229	195	273	5.34	6.98	2.60	10.72
F	Arabis sp.	1	-	-	-	-	-	-	-	-
F	Astragalus sp.	ab23	b32	ab14	b36	a2	.12	.04	.17	.01
F	Calochortus nuttallii	-	-	4	5	-	-	.01	.01	-
F	Castilleja sp.	-	2	-	-	-	.00	-	-	-
F	Collinsia parviflora (a)	-	-	-	3	1	-	-	.00	.00
F	Descurainia pinnata (a)	-	1	7	2	-	.00	.01	.01	-
F	Draba sp. (a)	-	6	-	-	-	.01	-	-	-
F	Erigeron pumilus	7	5	10	-	-	.01	.02	-	-
F	Eriogonum sp.	-	2	-	-	-	.00	-	-	-
F	Lappula occidentalis (a)	-	b43	ab18	c190	a3	.07	.03	1.77	.00
F	Machaeranthera canescens	ab11	b19	a-	a1	a-	.11	-	.03	-
F	Malcolmia africana	-	-	-	1	-	-	-	.01	-
F	Oenothera sp.	-	-	-	4	-	-	-	.16	-
F	Plantago patagonica (a)	-	b104	c191	b97	a9	.45	1.08	.46	.02
F	Ranunculus testiculatus (a)	-	-	-	-	5	-	-	-	.01
F	Sphaeralcea coccinea	a5	a11	a8	b49	a21	.05	.03	.68	.13
F	Townsendia incana	b54	b34	a8	b44	a-	.25	.07	.87	-
F	Trifolium sp.	-	-	-	3	-	-	-	.00	-
F	Unknown forb-annual (a)	-	2	-	-	-	.00	-	-	-
Total for Annual Forbs		0	156	216	292	18	0.54	1.13	2.25	0.03
Total for Perennial Forbs		101	105	44	143	23	0.56	0.18	1.95	0.13
Total for Forbs		101	261	260	435	41	1.11	1.31	4.21	0.17

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

BROWSE TRENDS--

Management unit 16C, Study no: 32

Type	Species	Strip Frequency				Average Cover %			
		'94	'99	'04	'09	'94	'99	'04	'09
B	Artemisia spinescens	31	0	0	17	.51	-	-	.79
B	Artemisia tridentata wyomingensis	69	72	17	21	3.58	4.68	.66	.93
B	Atriplex confertifolia	81	69	70	73	5.55	3.45	6.32	4.78
B	Ceratoides lanata	6	4	5	12	.06	.00	.21	.21
B	Chrysothamnus viscidiflorus	64	70	25	42	2.06	1.99	.46	.66
B	Gutierrezia sarothrae	1	0	0	0	.00	-	-	-
B	Opuntia sp.	17	21	14	18	.40	.36	.07	.48
B	Sarcobatus vermiculatus	12	14	16	14	1.61	1.35	2.06	2.00
B	Sclerocactus sp.	2	8	0	9	.03	.15	-	.04
B	Tetradymia spinosa	13	14	0	1	.19	.36	-	.00
Total for Browse		296	272	147	207	14.03	12.38	9.80	9.91

CANOPY COVER, LINE INTERCEPT--

Management unit 16C, Study no: 32

Species	Percent Cover	
	'04	'09
Artemisia spinescens	-	.23
Artemisia tridentata wyomingensis	.95	1.11
Atriplex confertifolia	7.31	4.09
Ceratoides lanata	.08	.03
Chrysothamnus viscidiflorus	.91	2.23
Opuntia sp.	.23	.16
Sarcobatus vermiculatus	3.96	2.50
Sclerocactus sp.	-	.20

BASIC COVER--

Management unit 16C, Study no: 32

Cover Type	Average Cover %				
	'88	'94	'99	'04	'09
Vegetation	2.50	22.87	19.34	16.51	20.31
Rock	0	.91	.50	.52	.43
Pavement	.75	.21	.46	.33	.34
Litter	20.00	14.56	17.69	22.10	20.43
Cryptogams	10.00	3.65	7.27	5.55	1.41
Bare Ground	66.75	56.71	52.81	64.86	63.60

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 32, Study Name: Muddy Creek

Effective rooting depth (in)	pH	sandy clay loam			%OM	PPM P	PPM K	ds/m
		%sand	%silt	%clay				
10.6	7.6	56	23.4	20.6	0.7	5.9	89.6	3.4

PELLET GROUP DATA--

Management unit 16C, Study no: 32

Type	Quadrat Frequency			
	'94	'99	'04	'09
Rabbit	10	12	5	12
Elk	35	55	44	43
Deer	33	9	3	6
Cattle	3	-	1	-

Days use per acre (ha)		
'99	'04	'09
-	-	-
70 (173)	73 (180)	80 (197)
12 (30)	19 (46)	5 (13)
1 (2)	6 (14)	3 (7)

BROWSE CHARACTERISTICS--

Management unit 16C, Study no: 32

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>Artemisia spinescens</i>									
88	1398	57	38	5	66	0	0	0	3/5
94	1560	1	71	28	-	46	0	10	4/9
99	0	0	0	0	-	0	0	0	-/-
04	0	0	0	0	-	0	0	0	-/-
09	1260	22	75	3	-	0	0	3	5/8
<i>Artemisia tridentata wyomingensis</i>									
88	7532	52	34	14	666	25	11	0	15/19
94	3120	7	68	25	-	32	3	10	13/17
99	3200	6	44	50	20	33	48	12	13/19
04	400	0	10	90	-	15	75	70	15/25
09	1500	53	25	21	-	9	67	19	13/22
<i>Atriplex confertifolia</i>									
88	7864	46	36	18	999	11	6	0	9/10
94	5580	5	86	9	-	.35	0	2	8/15
99	4340	17	64	20	20	10	.92	5	7/13
04	3480	2	82	16	360	3	0	12	10/20
09	4780	13	72	15	80	.83	.83	10	7/13
<i>Ceratoides lanata</i>									
88	598	33	67	0	-	11	33	0	6/6
94	140	0	86	14	-	43	0	0	6/6
99	120	0	17	83	20	0	100	0	4/5
04	120	0	100	0	120	33	17	33	9/11
09	420	14	86	0	-	67	10	0	6/7
<i>Chrysothamnus nauseosus</i>									
88	0	0	0	-	-	0	0	0	-/-
94	0	0	0	-	-	0	0	0	-/-
99	0	0	0	-	-	0	0	0	-/-
04	0	0	0	-	-	0	0	0	-/-
09	0	0	0	-	-	0	0	0	22/24

		Age class distribution					Utilization			
Year	Plants per Acre (excluding seedlings)	% Young	% Mature	% Decadent	Seedling (plants/acre)	% moderate	% heavy	% poor vigor	Average Height Crown (in)	
<i>Chrysothamnus viscidiflorus</i>										
88	9465	51	49	0	66	4	.70	.70	7/9	
94	4540	6	93	1	-	0	0	.88	9/11	
99	4080	11	84	4	40	15	.98	10	7/12	
04	960	4	69	27	20	0	0	29	10/16	
09	2080	16	72	12	-	0	0	39	7/12	
<i>Gutierrezia sarothrae</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	20	100	0	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	-/-	
<i>Opuntia sp.</i>										
88	133	0	100	0	-	0	0	0	6/16	
94	460	0	100	0	-	0	0	0	4/16	
99	760	18	76	5	120	0	0	5	5/13	
04	420	5	95	0	-	0	0	0	4/12	
09	480	4	92	4	-	0	0	8	4/13	
<i>Pediocactus simpsonii</i>										
88	0	0	0	-	-	0	0	0	-/-	
94	0	0	0	-	-	0	0	0	-/-	
99	0	0	0	-	-	0	0	0	-/-	
04	0	0	0	-	-	0	0	0	-/-	
09	0	0	0	-	-	0	0	0	5/13	
<i>Sarcobatus vermiculatus</i>										
88	399	83	17	0	-	0	17	0	19/31	
94	440	5	91	5	-	0	0	0	17/27	
99	640	13	72	16	-	0	0	13	16/30	
04	580	10	76	14	-	3	0	7	18/37	
09	620	13	81	6	-	3	0	0	20/28	
<i>Sclerocactus sp.</i>										
88	666	0	100	0	-	0	0	0	3/0	
94	120	0	100	0	-	0	0	0	3/4	
99	220	0	100	0	-	0	0	0	3/4	
04	0	0	0	0	-	0	0	0	-/-	
09	380	11	84	5	-	0	0	74	3/9	
<i>Tetradymia spinosa</i>										
88	66	0	100	0	-	0	0	0	12/16	
94	440	5	86	9	-	5	5	5	11/18	
99	600	13	80	7	-	0	3	97	4/11	
04	0	0	0	0	-	0	0	0	-/-	
09	20	0	100	0	-	0	0	0	6/12	