Trend Study 22-7-08

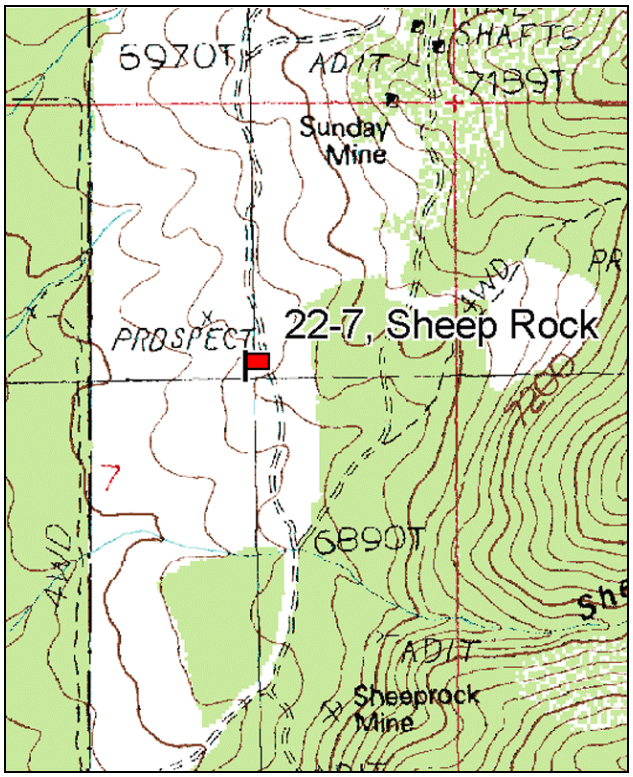
Study site name: Sheep Rock . Vegetation type: Chained, Seeded P-J .

Compass bearing: frequency baseline 180 degrees magnetic.

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

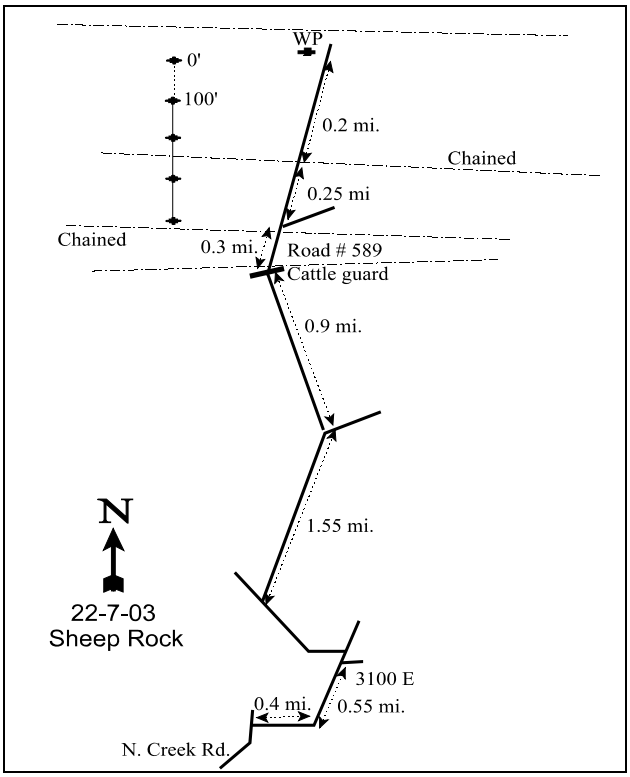
LOCATION DESCRIPTION

From the junction of SR 153 and North Creek Road (1200 E.) east of Beaver, proceed north on North Creek Road 5.0 miles to a fork (3800 N). Keep to the right on the pavement and continue 0.4 miles to another fork. Turn left onto 3100 E and drive 0.55 miles, crossing a bridge, to a fork in the road with a sheeprock sign. Turn left and after 100 yards take a sharp bend to the left to stay on the good road. Drive about 200 yards and keep to the right at another fork. Continue 0.175 miles and again keep right at a fork. Go 1.55 miles to a cattleguard and 0.15 miles beyond it to a fork. Turn to the left instead of crossing a cattleguard into a chained area. Drive 0.9 miles further to cross a cattleguard and enter the chained area (road # 589). Go 0.3 miles to a fork and stay left. After 0.25 miles you will again enter directly into the chained area. Continue 0.2 miles into the chaining to a witness post on the left side of the road. The frequency baseline starts 195 feet west of the witness post. The 0-foot baseline stake is a short rebar with browse tag #7058 attached.



Map Name: Beaver

Township 28S , Range 6W , Section 7



Diagrammatic Sketch

GPS: NAD 83, UTM 12S 362916 E, 4250194 N

DISCUSSION

Sheep Rock - Trend Study No. 22-7

Study Information

This study is located near the mouth of Sheep Rock Canyon on west side of the Tushar Mountains [elevation: 6,900 feet (2,103m), slope: 5-10%, aspect: west]. The study samples a Forest Service chaining and seeding project completed in the fall of 1981. The 2-way chaining treatment effectively reduced the pinyon-juniper overstory and the site is dominated by seeded perennial grasses. Fire has also been an influence as the site burned after the chaining. The fire consumed many of the downed pinyon-juniper snags and continued up the mountain into the untreated woodland. The fire reduced browse species, which are important for wildlife. One-quarter mile to the west is the BLM boundary and a 25-year old chaining. In some winters, deer spend much of the season at lower elevations. Judging from data collected at the nearby DWR Sheep Rock deer pellet group transect, use has been generally low on this site. With its abundance of valuable early season grasses, the area makes an excellent transition range in early spring and late fall for mule deer and winter range for elk. A pellet group transect in 1998 estimated 12 deer days use/acre (30 ddu/ha) and 52 cow days use/acre (128 cdu/ha). In 2003, use was estimated at 5 deer and 85 cow days use/acre (13 ddu/ha and 210 cdu/ha). Data from 2008 estimated 5 deer days use/acre (12 ddu/ha), 12 cow days use/acre (30 cdu/ha) and 8 elk days use/acre (20 edu/ha). Rabbit use was very high in 2008. Rabbit pellets were counted in 91% of quadrats.

Soil

Soils are sandy loam in texture with a slightly acidic pH (6.5). Average effective rooting depth was just over 11 inches. Perennial grasses and their associated litter provide the majority of the ground cover on this site, although both of these categories were much lower in 2003 compared to earlier readings. Pavement is also abundant on the surface estimated at 21% in 1998 and 26% in 2003. Bare ground was very low in 1985 and 1998, but moderate in 1991 and 2003. Soils were rated as stable in 2003 and 2008 from an erosion condition class assessment.

Browse

Pinyon pine (*Pinus edulis*) density has increased over time from 15 trees/acre in 1998, to 25 trees/acre in 2003, to 30 trees/acre in 2008. Utah juniper (*Juniperus osteosperma*) density has averaged about 44 trees/acre. Juniper cover increased from 2% in 2003 to 4% in 2008.

With the exception of pinyon and juniper, browse has been limited on this site over the life of the transect. Preferred species such as mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*), serviceberry (*Amelanchier utahensis*), curlleaf mahogany (*Cercocarpus ledifolius*), true mountain mahogany (*Cercocarpus montanus*), and bitterbrush (*Purshia tridentata*) are present in the area but at very low densities. Most of these species were not sampled in the transect other than being measured for height and crown. Gambel oak (*Quercus gambelii*) averaged about 300 stems/acre between 1998 and 2008 and shows only light use, good vigor, and no decadence.

Herbaceous Understory

Perennial grasses dominate this site. Crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*Agropyron intermedium*), and smooth brome (*Bromus inermis*) are the most abundant species. Sum of nested frequency was highest in 1998, declined in 2003 during very dry conditions, and increased in 2008. Cheatgrass (*Bromus inermis*) was most abundant in 1998 and was sampled in 87% of the quadrats. In 2003, cheatgrass nested frequency significantly declined and was only sampled in 40% of the quadrats. In 2008, nested frequency significantly increased, but was still lower than 1998. Cheatgrass cover was still very low in 2008. Native grasses have been rarely sampled.

In 1985, the only forbs identified were two seeded species, alfalfa (*Medicago sativa*) and small burnet (*Sanguisorba minor*). These seeded forbs have been very scarce. This is the result of the effects of selective

livestock grazing as well as a couple of drought cycles since alfalfa was seeded onto the site. The most abundant perennial forb in 1998, 2003 and 2008 was American vetch (*Vicia americana*), which is moderate to high in palatability for wildlife and livestock. Annual forbs have become increasingly more abundant with each reading, dependant on timing of precipitation.

1991 TREND ASSESSMENT

The browse trend is stable, but preferred species are very limited. Bitterbrush and Gambel oak have identical density estimates to 1985. The grasses of the herbaceous understory have a higher nested frequency value, but forbs are very scarce. Even with a slight decrease for forbs, they are still so scarce they are of little use on this site. Trend for perennial grasses is up and perennial forbs is slightly down, overall herbaceous understory is up.

browse - stable (0) grass - up (+2) forb - slightly down (-1)

1998 TREND ASSESSMENT

The browse trend is stable, but browse remains limited on the site. Gambel oak slightly increased in density in 1998, and 20 young mountain big sagebrush plants/acre were estimated as well. Photographs show that the pinyon and juniper trees are increasing in size over time. The perennial grass trend is slightly up. Sum of nested frequency for perennial grasses increased by 13%. Forb trend is up. Perennial forb nested frequency increased from only 4 to 136. Although cheatgrass is present on the site, it should remain under control with the very competitive perennial species on the site.

Winter Range Condition (DCI) - very poor (29) mid-level potential scale
browse - stable (0) grass - slightly up (+1) forb - up (+2)

2003 TREND ASSESSMENT

Trend for browse is stable, but as with the previous readings, preferred browse species remains very limited on the site. Mountain big sagebrush slightly increased in density (20 to 100 plants/acre), while Gambel oak slightly declined. The site is dominated by seeded grasses crested and intermediate wheatgrass, and smooth brome. Trend for the perennial grasses is down. Perennial grasses show significant declines in both nested frequency and average cover. A significant decline occurred in the nested frequency of intermediate wheatgrass and smooth brome which are less drought tolerant than crested wheatgrass. Cover of intermediate wheatgrass and smooth brome dropped from 10% and 12% in 1998, respectively, to about 3% in 2003. Perennial forbs have also declined in sum of nested frequency since 1998. The magnitude of the decline in perennial grass cover on this site was the largest for the management unit in 2003. Weedy annual forbs were very abundant in 2003. The one positive change in the understory in 2003 was the significant decline in cheatgrass frequency and cover, although quadrat frequency is still moderately high at 40%.

Winter Range Condition (DCI) -very poor (31) mid-level potential scale
browse - stable (0) grass - down (-2) forb - slightly down (-1)

2008 TREND ASSESSMENT

Trend for browse is stable, but as with the previous readings, preferred browse species remains very limited on the site. Mountain big sagebrush slightly decreased in density and is still of little use for a source of browse. Gambel oak slightly increased but still provides less than 1% cover. Trend for the perennial grasses is slightly up. Most of the perennial grasses show significant increases in both nested frequency and average cover. Cover of intermediate wheatgrass, crested wheatgrass and smooth brome all increased substantially in 2008. Trend for perennial forbs was slightly up with an increase in sum of nested frequency. Weedy annual forbs are moderately abundant in 2008. The negative change in the understory in 2008 was the significant increase in cheatgrass frequency. Cover is still less than 1%, however, it can become a problem again with a significant disturbance.

Winter Range Condition (DCI) - very poor - poor (36) mid-level potential scale
browse - stable (0) grass - slightly up (+1) forb - slightly up (+1)

HERBACEOUS TRENDS --
Management unit 22 , Study no: 7

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'98	'03	'08	'98	'03	'08
G	Agropyron cristatum	a89	b136	b170	ab139	b163	8.96	4.84	6.55
G	Agropyron intermedium	ab173	a240	c174	b118	c168	9.92	2.76	6.70
G	Agropyron spicatum	-	-	2	-	-	.03	-	-
G	Bromus inermis	a95	b135	c219	ab104	ab99	9.84	2.63	4.74
G	Bromus tectorum (a)	-	-	c298	a99	b152	11.51	1.31	.93
G	Elymus junceus	b29	ab11	a4	a1	ab21	.33	.03	.28
G	Poa secunda	a3	a2	b40	c82	c61	.91	2.80	.83
G	Sitanion hystrix	b22	b18	a4	a-	a6	.01	-	.03
Total for Annual Grasses		0	0	298	99	152	11.51	1.31	0.93
Total for Perennial Grasses		411	542	613	444	518	30.01	13.08	19.14
Total for Grasses		411	542	911	543	670	41.53	14.39	20.07
F	Agoseris glauca	-	-	4	4	1	.01	.03	.00
F	Alyssum alyssoides (a)	-	-	a63	b105	c213	.16	1.63	.79
F	Arabis sp.	-	3	5	-	7	.01	-	.01
F	Arenaria sp.	-	-	-	1	-	-	.00	-
F	Astragalus convallarius	-	-	1	-	3	.03	-	.00
F	Astragalus sp.	-	-	-	-	4	-	-	.01
F	Astragalus sp.	a-	a-	a2	ab10	b15	.00	.36	.20
F	Camelina microcarpa (a)	-	-	b17	a2	a-	.03	.03	-
F	Calochortus nuttallii	-	-	a2	ab4	b9	.00	.01	.02
F	Chaenactis douglasii	-	-	1	-	-	.00	-	-
F	Collinsia parviflora (a)	-	-	a56	c212	b175	.11	4.73	.46
F	Crepis acuminata	-	-	1	3	6	.03	.03	.01
F	Cymopterus sp.	-	-	1	1	1	.00	.00	.01
F	Descurainia pinnata (a)	-	-	a-	b7	a-	-	.03	-
F	Draba sp. (a)	-	-	ab12	b13	a-	.02	.03	-
F	Erodium cicutarium (a)	-	-	-	3	7	-	.03	.21
F	Eriogonum ovalifolium	-	-	-	-	3	-	-	.03
F	Eriogonum racemosum	-	-	3	3	-	.03	.03	-
F	Gilia sp. (a)	-	-	a-	b53	a1	-	.62	.00
F	Holosteum umbellatum (a)	-	-	a3	b15	a-	.01	.05	-

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'98	'03	'08	'98	'03	'08
F	Lappula occidentalis (a)	-	-	$_{a}$32	$_{b}$76	$_{b}$94	.10	2.67	.84
F	Leucelene ericoides	-	-	5	-	-	.15	-	-
F	Medicago sativa	$_{b}$35	$_{a}$-	$_{a}$-	$_{a}$1	$_{a}$-	-	.03	-
F	Microsteris gracilis (a)	-	-	$_{b}$20	$_{c}$175	$_{a}$-	.16	1.93	-
F	Oenothera pallida	-	-	-	-	-	-	-	-
F	Orobanche fasciculata	-	-	2	-	-	.00	-	-
F	Phacelia sp.	-	1	-	-	-	-	-	-
F	Phlox longifolia	$_{a}$-	$_{a}$-	$_{a}$2	$_{b}$10	$_{a}$5	.01	.05	.01
F	Polygonum douglasii (a)	-	-	$_{a}$5	$_{a}$-	$_{b}$13	.01	-	.03
F	Ranunculus testiculatus (a)	-	-	$_{a}$5	$_{b}$65	$_{c}$158	.06	1.30	1.66
F	Sanguisorba minor	1	-	-	-	-	-	-	-
F	Sphaeralcea coccinea	-	-	-	-	3	-	-	.00
F	Streptanthus cordatus	-	-	-	5	6	-	.06	.04
F	Tragopogon dubius	-	-	2	-	-	.00	-	-
F	Unknown forb-perennial	$_{b}$20	$_{a}$-	$_{a}$-	$_{a}$-	$_{a}$-	-	-	-
F	Vicia americana	$_{a}$-	$_{a}$-	$_{c}$105	$_{b}$67	$_{c}$113	2.28	1.44	2.22
Total for Annual Forbs		0	0	213	726	661	0.67	13.07	4.00
Total for Perennial Forbs		56	4	136	109	176	2.59	2.06	2.59
Total for Forbs		56	4	349	835	837	3.26	15.13	6.60

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

BROWSE TRENDS --
Management unit 22 , Study no: 7

Type	Species	Strip Frequency			Average Cover %		
		'98	'03	'08	'98	'03	'08
B	Artemisia tridentata vaseyana	1	3	2	.63	.06	.15
B	Gutierrezia sarothrae	0	1	3	-	.15	.03
B	Juniperus osteosperma	2	4	5	1.79	1.72	3.14
B	Quercus gambelii	4	2	2	1.79	1.78	.91
Total for Browse		7	10	12	4.21	3.73	4.25

CANOPY COVER, LINE INTERCEPT --
Management unit 22 , Study no: 7

Species	Percent Cover	
	'03	'08
Artemisia tridentata vaseyana	.56	.65
Gutierrezia sarothrae	-	.06
Juniperus osteosperma	2.31	3.98
Pinus edulis	-	.13
Quercus gambelii	1.79	1.50

POINT-QUARTER TREE DATA --
Management unit 22 , Study no: 7

Species	Trees per Acre		
	'98	'03	'08
Juniperus osteosperma	47	36	49
Pinus edulis	15	25	30

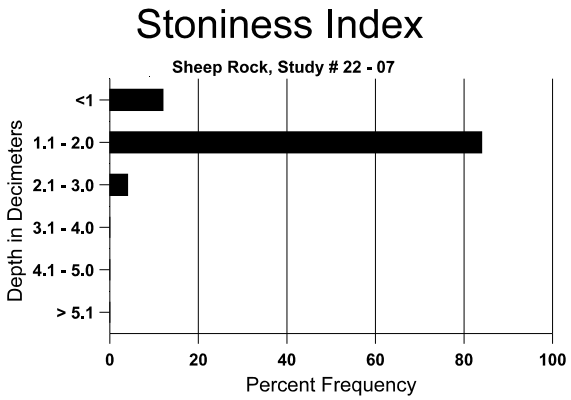
Average diameter (in)		
'98	'03	'08
5.4	4.5	5.5
4.1	3.3	4.4

BASIC COVER --
Management unit 22 , Study no: 7

Cover Type	Average Cover %				
	'85	'91	'98	'03	'08
Vegetation	10.50	3.00	48.07	36.65	32.06
Rock	1.50	2.50	3.09	3.19	3.42
Pavement	28.75	16.25	21.02	25.52	33.02
Litter	50.25	52.25	50.47	32.25	33.37
Cryptogams	0	0	.05	.01	.08
Bare Ground	9.00	26.00	7.12	17.78	13.61

SOIL ANALYSIS DATA --
Management unit 22, Study no: 7, Study Name: Sheep Rock

Effective rooting depth (in)	Temp °F (depth)	pH	sandy loam			%0M	PPM P	PPM K	ds/m
			%sand	%silt	%clay				
11.2	47.0 (15.1)	6.5	54.0	28.4	17.6	3.0	10.0	172.8	0.9



PELLET GROUP DATA --
Management unit 22 , Study no: 7

Type	Quadrat Frequency		
	'98	'03	'08
Rabbit	6	14	91
Elk	1	-	3
Deer	4	4	12
Cattle	28	17	22

Days use per acre (ha)		
'98	'03	'08
-	-	-
-	-	8 (20)
12 (30)	5 (13)	5 (12)
52 (128)	85 (210)	12 (30)

BROWSE CHARACTERISTICS --
Management unit 22 , Study no: 7

		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)
Amelanchier utahensis												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	-	0	35/19
03	**0**	-	-	-	-	-	0	0	-	-	0	25/28
08	**0**	-	-	-	-	-	0	0	-	-	0	29/35
Artemisia tridentata vaseyana												
85	**0**	-	-	-	-	-	0	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	0	-	0	-/-
98	**20**	-	-	20	-	-	0	0	0	-	0	27/38
03	**100**	-	20	80	-	-	20	0	0	-	0	24/38
08	**60**	-	-	40	20	40	67	0	33	-	0	28/38

		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)
Cercocarpus ledifolius												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	-	0	37/48
08	**0**	-	-	-	-	-	0	0	-	-	0	57/54
Cercocarpus montanus												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	-	0	27/30
03	**0**	-	-	-	-	-	0	0	-	-	0	22/32
08	**0**	-	-	-	-	-	0	0	-	-	0	37/34
Chrysothamnus nauseosus hololeucus												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	-	0	35/66
03	**0**	-	-	-	-	-	0	0	-	-	0	39/64
08	**0**	-	-	-	-	-	0	0	-	-	0	15/26
Chrysothamnus viscidiflorus												
85	**866**	-	133	733	-	-	0	0	-	-	0	13/11
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
98	**0**	-	-	-	-	-	0	0	-	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	-	0	-/-
08	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Gutierrezia sarothrae												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**266**	-	-	266	-	-	0	0	-	-	0	10/11
98	**0**	-	-	-	-	-	0	0	-	-	0	12/12
03	**20**	-	-	20	-	-	0	0	-	-	0	11/13
08	**60**	200	-	60	-	-	0	0	-	-	0	5/6

		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)
Juniperus osteosperma												
85	**66**	-	66	-	-	-	0	0	-	-	0	-/-
91	**66**	66	-	66	-	-	0	0	-	-	0	38/36
98	**40**	-	-	40	-	20	0	0	-	-	0	-/-
03	**80**	-	-	80	-	-	0	0	-	-	0	-/-
08	**100**	-	-	100	-	-	0	0	-	-	0	-/-
Pinus edulis												
85	**0**	-	-	-	-	-	0	0	-	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	-	0	-/-
98	**0**	-	-	-	-	40	0	0	-	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	-	0	-/-
08	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Purshia tridentata												
85	**66**	-	66	-	-	-	0	0	0	-	0	-/-
91	**66**	-	-	-	66	-	0	100	100	30	100	-/-
98	**0**	-	-	-	-	-	0	0	0	-	0	-/-
03	**0**	-	-	-	-	-	0	0	0	-	0	19/47
08	**0**	-	-	-	-	-	0	0	0	-	0	23/57
Quercus gambelii												
85	**133**	-	133	-	-	-	0	0	0	-	0	-/-
91	**133**	-	133	-	-	-	100	0	0	-	0	-/-
98	**380**	-	100	260	20	-	0	0	5	-	0	44/30
03	**260**	-	-	260	-	60	0	0	0	-	0	56/30
08	**320**	-	-	280	40	160	0	0	13	6	6	53/35