

Trend Study 9-6-05

Study site name: Above Steinaker Draw .

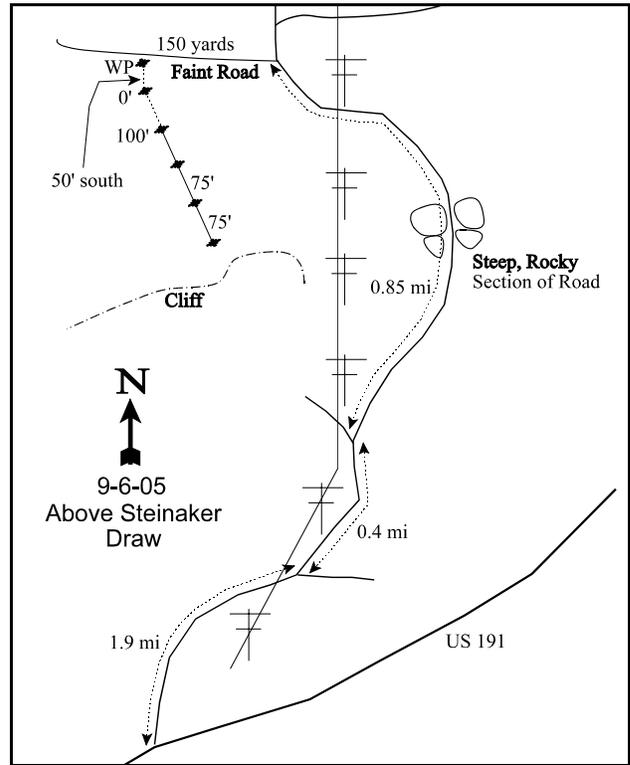
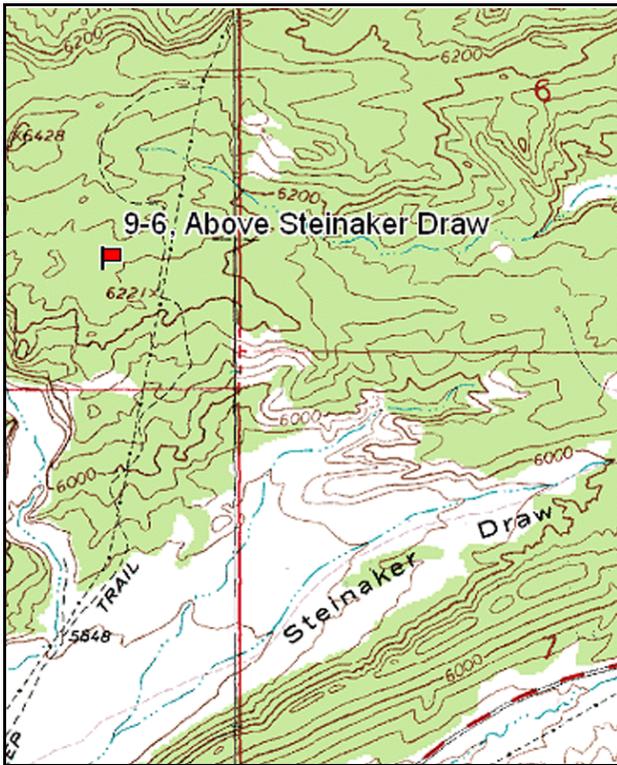
Vegetation type: Pinyon-Juniper .

Compass bearing: frequency baseline 143 degrees magnetic.

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

LOCATION DESCRIPTION

One mile north of Steinaker Reservoir, turn left off highway US 191. Staying to the right, go northeast on the dirt road for approximately 1.9 miles. Just after crossing under the power lines, there is a fork. Bear left at this fork, going 0.4 miles to a fork at the base of the hill. Proceed up the right fork, following the power lines, going approximately 0.85 miles to the top of a rough, sandy 4-WD road. Just after you come up a very steep, rocky section, you top out and the road bends to the right beneath the power lines. Beyond the bend is a faint road leading off to the west. Walk along this trail about 150 yards to a witness post on the left side of the old road. The study site is in the juniper/sage on the south side of the road. The 0-foot baseline stake is 50 feet south of the witness post.



Map Name: Steinaker Reservoir

Diagrammatic Sketch

Township 3S, Range 21E, Section 1

GPS: NAD 27, UTM 12T 4493285 N, 626581 E

## DISCUSSION

### Above Steinaker Draw - Trend Study No. 9-6

The Above Steinaker Draw study was established in 1988. It is located in an open juniper stand with an understory of Wyoming big sagebrush. This study was added to replace an old study, Steinaker Draw, which was established in 1982 and sampled a little-used desert shrub range type. The study site lies in a small basin that has a gentle slope in the bottom (2%), but gets steeper on the short slopes which run up to sandstone ridges. The general aspect is to the northeast. The area does not receive much snow, annual precipitation ranges from 9 to 12 inches. The elevation is 6,250 feet. Old sign of wintering deer and elk were abundant although in 2000, with several mild winters, fresh sign was scarce. Pellet group data from 2000 estimated 6 deer and 9 elk days use/acre (15 ddu/ha and 22 edu/ha). No cattle pats were sampled in 2000. Pellet group data from 2005 estimated 60 deer and 36 elk, and 1 cow days use/acre (149 ddu/ha, 88 edu/ha, and 2 cdu/ha). Cattle graze the Red Mountain allotment, managed by the BLM, in spring or fall as part of a deferred system.

The soil is a loamy sand in the LaMarsh-Rock Outcrop complex. Estimated effective rooting depth is just over 16 inches and penetrometer readings show rock to be evenly distributed throughout the upper 20 inches of the soil profile. There are areas where soils are more shallow resulting in exposed bedrock. Soil phosphorus levels are 6.2 ppm, values less than 6 ppm may limit normal plant growth and development (Tiedemann and Lopez 2004). Soils are often without plant cover and tend to support well-developed cryptogams. Cryptogamic crust cover has been high in all years. Although permeability is rapid, surface runoff is moderate and erosion potential is high. The soil is most vulnerable during high intensity summer thunderstorms. At most other times, erosion is localized and not severe. Moderate pedestaling occurs around the stems of sagebrush and the trunks of juniper trees. The erosion condition class determined soil movement as stable in 2005.

The mature juniper overstory estimated point-center quarter density of 65 juniper trees/acre with an average diameter of 11.8 inches in 2000. In 2005, point-center quarter estimated 86 junipers/acre with a mean diameter of 13.0 inches. Overhead canopy cover was estimated at 10% in 2000 and 12% in 2005. Due to a low average precipitation, this site is marginal for pinyon. Therefore, pinyon had an estimated density of only 6 trees/acre in 2000, with an average trunk diameter of 3 inches.

Openings in the juniper woodland allow for a moderate stand of Wyoming big sagebrush. Wyoming big sagebrush density estimated about 2,600 plants/acre in both 1995 and 2000. This decreased to 1,860 plants/acre in 2005. Percent decadence has increased from 11% in 1995 to 32% in 2000, and reached 55% in 2005. Sagebrush cover was estimated at 12% in 1995, 10% in 2000, and 8% in 2005. Vigor was generally good with fair growth and seed production in both 1988 and 1995. Poor vigor slightly increased to 9% in 2000 and then again increased in 2005 to 27%. Increases in poor vigor and percent decadency are partially due to drought, but utilization increased from light use to moderate-heavy. Young recruitment was good in both 1988 and 1995 at 12 and 16%, but decreased to 4% in 2000 and 1% in 2005. Annual grasses (cheatgrass) are reducing soil moisture and nutrients for young shrubs (Hall et al. 1999).

Other shrubs include a small population of spiny hopsage and Black sagebrush. Both species are palatable and show light to moderate use. Density for each species is under 160 plants/acre in all data collection years. Both species displayed poor vigor in 2000 and 2005, most likely from drought conditions.

The herbaceous understory is dominated by annuals. Cheatgrass and sixweeks fescue are the most abundant grasses and account for 43% of the total vegetation cover. Nested frequency increased significantly for both cheatgrass and sixweeks fescue in 2005. Sixweeks fescue was fairly abundant in 1995, but infrequent in 2000. Some places support a dense stand of cheatgrass, while perennial species are clumped in others. Thickspike wheatgrass was fairly abundant in 1995, but decreased significantly in 2000 and remained low in 2005.

Needle-and-thread is the most dominant perennial grass. Others include Sandberg bluegrass and galleta. Sum of nested frequency of perennial grasses and forbs decreased by 37% in 2000 and decreased another 9% in 2005. Forbs are rare and reduced substantially with drought conditions between 2000 and 2005. Twenty-one species were sampled in 1995, this decreased to 12 species in 2000, and rose slightly in 2005 to 16 species. Lobeleaf groundsel is the most abundant forb, but decreased significantly in 2005.

#### 1988 APPARENT TREND ASSESSMENT

The percentage of basal vegetative cover is relatively low (5%), but litter cover is higher than expected (55%). Cryptogams provide a substantial amount of ground cover (21%), thereby reducing the amount of bare soil to 18%, which is relatively low for this type of site. Trend for soil appears stable. Wyoming big sagebrush appears to be slightly down due to its moderately high decadency rate. Apparent trend for the herbaceous understory is stable.

#### 1995 TREND ASSESSMENT

Bare ground slightly increased from 18% to 20%, while cryptogamic cover and litter decreased. Due to the variable ground cover, the much larger sampling design may be responsible for some of the changes in ground cover. Sum of nested frequency of vegetation and litter are high indicating well dispersed cover for these cover classes. Additionally, grasses and forbs account for 43% of the total vegetation cover. Sum of nested frequency for perennial grasses and forbs have also increased since 1988. Taking these factors into consideration, trend for soil is considered stable. Trend for Wyoming big sagebrush is slightly up. Percent decadence has declined from 57% to 11% and heavy use has also declined. The herbaceous understory trend is down. Overall, the sum of nested frequency for perennial grasses decreased substantially. Sum of nested frequency for perennial forbs increased from 13 to 168, but they typically provide less than 1% total cover. The Desirable Components Index rated this site as good with a score of 48 due to good browse cover, low decadence, moderate percent cover of annual grasses, but only fair perennial grass cover.

#### TREND ASSESSMENT

soil - stable (0)

browse - slightly up (+1)

herbaceous understory - down (-2)

winter range condition (DC Index) - Good (48) Lower Potential scale

#### 2000 TREND ASSESSMENT

Trend for soil is stable. Cover from cryptogams doubled, while bare ground decreased to 17% which is relatively low for this community type. The ratio of protective ground cover (vegetation, litter, and cryptogams) to bare soil is relatively high at over 4:1, which indicates well dispersed cover over the site. Trend for browse is slightly down. The key species, Wyoming big sagebrush shows increases percent decadency from 11% to 32%, a decrease in recruitment from 16% to 4%, and a slight increase in poor vigor from 2% to 9%. Drought is the principle factor driving these downward trends. With a return to normal precipitation in the future, these parameters should improve. Trend for the herbaceous understory is down. Sum of nested frequency of perennial grasses and forbs decreased by 37% in 2000 due to drought. Composition is poor as annual species make up a significant portion of the understory at this site. The Desirable Components Index rated this site as fair with a score of 32 due to good browse cover, moderate to high decadence, moderate percent cover of annual grasses, but low perennial grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - slightly down (-1)

herbaceous understory - down (-2)

winter range condition (DC Index) - Fair (32) Lower Potential scale

2005 TREND ASSESSMENT

Trend for soil continues to be stable. Protective ground cover (vegetation, litter, and cryptogams) to bare soil has decreased slightly from 2000, but still provides good protection from erosion. Bare ground nested frequency increased slightly and cryptograms decreased slightly. Trend for key browse Wyoming big sagebrush is down. Density decreased from 2,620 plants/acre in 2000 to 1,860 in 2005. Percent decadence continued to increase from 32% in 2000 to 55% in 2005. Over half the population is decadent and 27% of the population was classified as dying in 2005. Of all four readings, young recruitment was the lowest this year, which may be partially due to the increase in cheatgrass. Trend for herbaceous understory is slightly down. Perennial grasses have improved slightly in the 2000 reading, but annual grasses, cheatgrass and sixweeks fescue, have increased 89%. The majority of the species composition is made up of annual species. The Desirable Components Index rated this site as poor with a score of 12 due to fair browse cover, high percent decadence, high percent cover of annual grasses, and low perennial grass cover.

TREND ASSESSMENT

soil - stable (0)

browse - down (-2)

herbaceous understory - slightly down (-1)

winter range condition (DC Index) - Poor (12) Lower Potential scale

HERBACEOUS TRENDS --

Management unit 09 , Study no: 6

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
G	Agropyron dasystachyum	<sub>b</sub> 136	<sub>b</sub> 141	<sub>a</sub> 60	<sub>a</sub> 46	4.41	.73	.42
G	Bromus tectorum (a)	-	<sub>a</sub> 212	<sub>a</sub> 249	<sub>b</sub> 314	5.16	5.40	14.89
G	Hilaria jamesii	<sub>b</sub> 113	<sub>a</sub> 13	<sub>a</sub> 23	<sub>a</sub> 25	.13	.34	.65
G	Oryzopsis hymenoides	<sub>b</sub> 17	<sub>ab</sub> 4	<sub>a</sub> -	<sub>a</sub> 1	.04	-	.01
G	Poa fendleriana	<sub>b</sub> 23	<sub>a</sub> 6	<sub>a</sub> -	<sub>b</sub> 18	.04	-	.41
G	Poa secunda	41	40	28	44	.30	.55	.87
G	Sitanion hystrix	3	-	-	-	-	-	-
G	Sporobolus cryptandrus	-	3	-	4	.38	-	.15
G	Stipa comata	52	33	40	41	.70	1.36	1.56
G	Vulpia octoflora (a)	-	<sub>b</sub> 208	<sub>a</sub> 21	<sub>b</sub> 197	1.04	.04	3.60
Total for Annual Grasses		0	420	270	511	6.21	5.44	18.50
Total for Perennial Grasses		385	240	151	179	6.02	2.99	4.09
Total for Grasses		385	660	421	690	12.23	8.43	22.59
F	Arabis sp.	1	6	-	-	.01	-	-

Type	Species	Nested Frequency				Average Cover %		
		'88	'95	'00	'05	'95	'00	'05
F	Astragalus sp.	-	-	-	2	-	-	.00
F	Calochortus nuttallii	5	1	-	-	.00	-	-
F	Chaenactis douglasii	-	1	-	-	.00	-	-
F	Chenopodium fremontii (a)	-	a-	a-	b11	-	-	.05
F	Chenopodium leptophyllum(a)	-	b34	a-	b28	.09	-	.05
F	Collinsia parviflora (a)	-	b40	a2	a9	.08	.00	.05
F	Cryptantha sp.	a1	b52	a-	a-	.22	-	-
F	Delphinium nuttallianum	a-	a-	a2	b12	-	.00	.08
F	Descurainia pinnata (a)	a4	b51	a-	b29	.21	-	.50
F	Draba sp. (a)	-	b53	a-	a2	.14	-	.00
F	Eriogonum cernuum (a)	-	b16	a-	ab3	.03	-	.04
F	Erigeron sp.	a-	b9	ab3	a-	.02	.01	-
F	Eriogonum sp.	-	5	1	-	.03	.00	-
F	Gilia sp. (a)	-	b64	a-	a5	.21	-	.01
F	Hymenoxys acaulis	-	-	7	-	-	.01	-
F	Ipomopsis aggregata	-	8	-	-	.04	-	-
F	Lappula occidentalis (a)	-	c78	a16	b46	.28	.17	.30
F	Lactuca serriola	-	3	-	-	.01	-	-
F	Lepidium sp. (a)	a9	b74	a2	a17	.27	.00	.21
F	Lomatium sp.	-	3	4	-	.03	.06	-
F	Lupinus argenteus	-	-	-	-	-	.03	-
F	Machaeranthera canescens	-	-	-	7	-	-	.04
F	Mentzelia sp.	-	-	-	3	-	-	.15
F	Oenothera sp.	-	4	-	-	.01	-	-
F	Polygonum douglasii (a)	-	b25	a2	ab11	.06	.00	.04
F	Schoenocrambe linifolia	-	-	-	1	-	-	.00
F	Senecio multilobatus	a5	c70	c80	a30	.15	2.24	.93
F	Sphaeralcea coccinea	1	-	-	-	-	-	-
F	Townsendia incana	-	6	8	-	.04	.02	-
Total for Annual Forbs		13	435	22	161	1.39	0.18	1.27
Total for Perennial Forbs		13	168	105	55	0.59	2.38	1.21
Total for Forbs		26	603	127	216	1.98	2.57	2.49

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

BROWSE TRENDS --

Management unit 09 , Study no: 6

Type	Species	Strip Frequency			Average Cover %		
		'95	'00	'05	'95	'00	'05
B	<i>Artemisia nova</i>	0	3	2	.38	.91	.15
B	<i>Artemisia tridentata wyomingensis</i>	61	62	53	11.60	10.16	7.92
B	<i>Chrysothamnus nauseosus</i>	0	2	5	-	.06	-
B	<i>Chrysothamnus viscidiflorus viscidiflorus</i>	14	10	5	1.64	1.20	.76
B	<i>Ephedra viridis</i>	3	3	3	.15	.15	.03
B	<i>Grayia spinosa</i>	8	9	8	1.52	2.36	2.21
B	<i>Gutierrezia sarothrae</i>	4	2	0	.03	-	-
B	<i>Juniperus osteosperma</i>	0	4	5	2.20	3.99	4.30
B	<i>Opuntia sp.</i>	36	31	36	1.50	1.01	2.11
Total for Browse		126	126	117	19.03	19.85	17.50

CANOPY COVER, LINE INTERCEPT --

Management unit 09 , Study no: 6

Species	Percent Cover	
	'00	'05
<i>Artemisia tridentata wyomingensis</i>	-	9.10
<i>Chrysothamnus nauseosus</i>	-	.28
<i>Chrysothamnus viscidiflorus viscidiflorus</i>	-	.65
<i>Ephedra viridis</i>	-	.01
<i>Grayia spinosa</i>	-	2.21
<i>Juniperus osteosperma</i>	10.39	12.23
<i>Opuntia sp.</i>	-	1.03

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 09 , Study no: 6

Species	Average leader growth (in)
	'05
<i>Artemisia tridentata wyomingensis</i>	2.7

POINT-QUARTER TREE DATA --

Management unit 09 , Study no: 6

Species	Trees per Acre		Average diameter (in)	
	'00	'05	'00	'05
Juniperus osteosperma	65	86	11.8	13.0

BASIC COVER --

Management unit 09 , Study no: 6

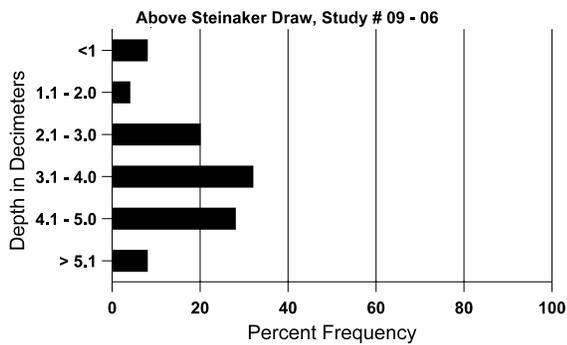
Cover Type	Average Cover %			
	'88	'95	'00	'05
Vegetation	4.75	35.26	31.51	38.94
Rock	.25	.41	.15	.15
Pavement	0	.00	0	0
Litter	55.50	48.90	46.34	35.62
Cryptogams	21.25	11.38	23.07	14.13
Bare Ground	18.25	20.29	17.57	24.15

SOIL ANALYSIS DATA --

Herd Unit 09, Study # 6, Study Name: Above Steinaker Draw

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	ppm P	ppm K	dS/m
16.4	35.6 (17.9)	7.0	82.4	7.7	9.9	0.5	6.2	48.0	0.4

Stoniness Index



PELLET GROUP DATA --

Management unit 09 , Study no: 6

Type	Quadrat Frequency			Days use per acre (ha)	
	'95	'00	'05	'00	'05
Rabbit	28	67	81	-	-
Elk	29	32	34	9 (23)	36 (88)
Deer	39	18	46	6 (15)	60 (149)
Cattle	1	-	-	-	1 (2)

BROWSE CHARACTERISTICS --  
Management unit 09 , 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 nova</b>												
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	0	-	-	-	-	-	0	0	0	-	0	7/17
00	60	-	-	40	20	20	0	0	33	33	33	18/25
05	40	-	-	20	20	60	50	0	50	50	50	14/20
<b>Artemisia tridentata wyomingensis</b>												
88	2165	66	266	666	1233	-	45	14	57	-	3	30/24
95	2580	20	420	1880	280	380	14	.77	11	2	2	26/38
00	2620	-	100	1680	840	660	25	.76	32	9	9	29/39
05	1860	60	20	820	1020	800	38	54	55	27	27	30/40
<b>Ceratoides lanata</b>												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	-/-
05	0	-	-	-	-	-	0	0	-	-	0	13/10
<b>Cercocarpus montanus</b>												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
95	0	-	-	-	-	-	0	0	-	-	0	-/-
00	0	-	-	-	-	-	0	0	-	-	0	38/60
05	0	-	-	-	-	-	0	0	-	-	0	43/63
<b>Chrysothamnus nauseosus</b>												
88	0	-	-	-	-	-	0	0	0	-	0	-/-
95	0	-	-	-	-	-	0	0	0	-	0	-/-
00	40	-	20	20	-	20	0	0	0	-	0	28/24
05	100	-	-	60	40	20	80	0	40	20	20	19/18
<b>Chrysothamnus viscidiflorus viscidiflorus</b>												
88	99	-	33	33	33	-	0	0	33	20	100	18/20
95	320	-	60	240	20	-	44	0	6	-	0	19/21
00	220	-	-	200	20	-	0	0	9	9	9	13/13
05	100	-	-	20	80	20	20	0	80	60	60	17/21
<b>Ephedra viridis</b>												
88	132	-	66	33	33	-	25	50	25	-	0	15/14
95	60	-	20	40	-	-	0	0	0	-	0	21/24
00	60	-	-	60	-	-	67	0	0	-	0	20/23
05	60	80	-	40	20	-	0	33	33	33	33	22/24

		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>Grayia spinosa</i>												
88	<b>166</b>	-	-	66	100	-	40	20	60	-	0	22/23
95	<b>160</b>	-	-	140	20	-	25	13	13	13	13	27/45
00	<b>180</b>	-	-	40	140	-	22	0	78	56	56	32/47
05	<b>160</b>	-	-	80	80	20	0	0	50	38	100	32/51
<i>Gutierrezia sarothrae</i>												
88	<b>0</b>	-	-	-	-	-	0	0	-	-	0	-/-
95	<b>420</b>	-	-	420	-	-	71	0	-	-	0	12/12
00	<b>40</b>	-	-	40	-	-	0	0	-	-	0	7/9
05	<b>0</b>	-	-	-	-	-	0	0	-	-	0	9/9
<i>Juniperus osteosperma</i>												
88	<b>133</b>	-	100	33	-	-	0	0	0	-	0	72/57
95	<b>0</b>	-	-	-	-	-	0	0	0	-	0	-/-
00	<b>100</b>	-	-	60	40	-	0	0	40	20	20	-/-
05	<b>100</b>	-	-	60	40	20	20	0	40	20	20	-/-
<i>Opuntia sp.</i>												
88	<b>1132</b>	-	166	966	-	-	0	0	0	-	0	3/11
95	<b>3520</b>	40	300	3220	-	-	0	0	0	-	0	3/11
00	<b>2580</b>	40	60	2280	240	140	0	0	9	7	7	3/12
05	<b>1960</b>	-	-	1960	-	-	0	0	0	-	65	4/10