

Trend Study 23-1-08

Study site name: Bear Ridge.

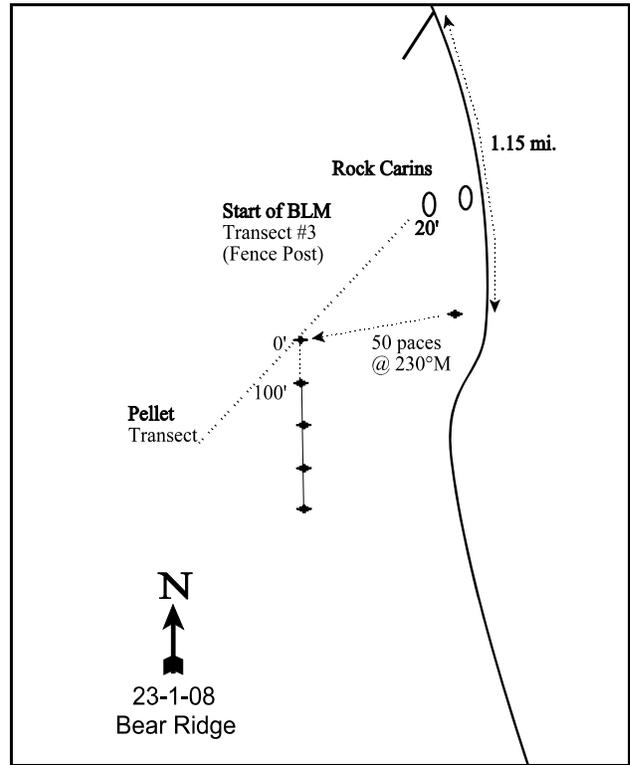
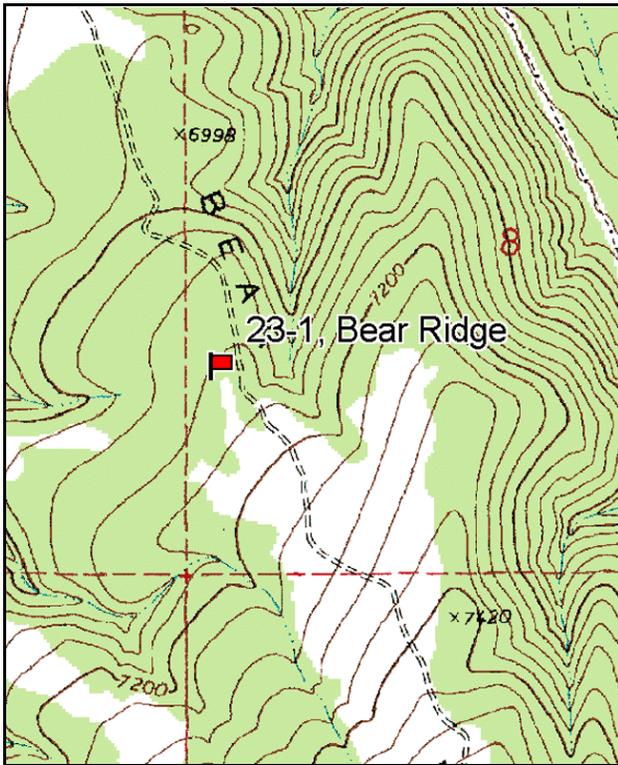
Vegetation type: Juniper-Pinyon.

Compass bearing: frequency baseline 165 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: belt 1 on 1ft, belt 2 on 7ft.

LOCATION DESCRIPTION

From Richfield, go east on Highway 119 to the junction of U-24. One hundred yards before the intersection of Hwy 119 and U-24, turn south on a dirt road. Follow this road for 1.5 miles to a hairpin turn, keep right. Go 0.55 miles to a fork, bear left and go 1.15 miles more to a witness post on the west side of the road. Walk 50 paces at 230 degrees magnetic to the 0-foot baseline stake. The trend study stakes are rebar 2-1/2 feet tall, the 0-foot stake is marked by browse tag #7038.



Map Name: Water Creek Canyon

Diagrammatic Sketch

Township 24S, Range 1W, Section 8

GPS: NAD 83, UTM 12S 418271 E, 4287692 N

DISCUSSION

Bear Ridge - Trend Study No. 23-1

Study Information

This study is located near the top of Bear Ridge, southeast of Richfield [elevation: 7,120 feet (2,170 m), slope: 7%, aspect: northwest]. The ridge is covered by a mature pinyon-juniper stand with a fairly abundant understory of shrubs and herbaceous vegetation. This land is administered by the BLM and is considered normal winter range for big game. Pellet group data from the DWR Bell Rock transect indicated that deer use was low but relatively stable through 1985, with an average of 9 days use/acre (22 ddu/ha) (Jense et al. 1985). Deer use from 1985 to 1991 averaged almost 15 days use/acre (36 ddu/ha) (Jense et al. 1991). There was no sign of elk use at that time. Pellet group data collected along the study baseline estimated 52 deer days use/acre (128 ddu/ha) in 1998, 54 days use/acre (134 ddu/ha) in 2003, and 34 days use/acre (83 ddu/ha) in 2008. Elk use was noted as minimal in 1998 and 2003, and was estimated at 1 day use/acre (3 edu/ha) in 2008. Livestock grazing pressure appears to be light. No sign of cattle grazing was noted in 1998 or 2003, and cattle use was estimated at 1 day use/acre (2 cdu/ha) in 2008.

Soil

The soil is a loam with a neutral reaction (pH 7.3). Relative combined vegetation and litter cover was 55%-58% from 1998 to 2008, and relative combined rock and pavement cover was 28%-33%. Relative bare ground cover decreased slightly from 16% in 1998 to 10% by 2008. The erosion condition was classified as stable in 2003 and 2008.

Browse

Preferred browse is provided by black sagebrush (*Artemisia nova*), mountain big sagebrush (*A. tridentata* ssp. *vaseyana*), and antelope bitterbrush (*Purshia tridentata*). Black sagebrush provided 2% quadrat cover in 1998 and 2003 and 1% in 2008. Density steadily decreased from 1,300 plants/acre in 1998 to 740 plants/acre in 2008. Decadence of black sagebrush was high in all sample years, and ranged from 34% of the population to 77%. Young black sagebrush plants comprised less than 10% of the population in all sample years. Black sagebrush plants displaying poor vigor decreased from 24% of the population in 1985 to 9% in 1998, then increased to 30% by 2008. Use of black sagebrush was moderate-heavy in 1985, light-moderate in 1991 and 1998, and mostly light in 2003 and 2008.

Mountain big sagebrush quadrat cover decreased from 3% in 1998 to less than 1% in 2003, and it provided almost no cover in 2008. Density steadily decreased from 1,100 plants/acre in 1998 to 520 plants/acre in 2008. Decadence of mountain big sagebrush increased from 57% of the population in 1985 to 100% in 2008. Young mountain big sagebrush recruitment fluctuated between 9% of the population and 31% from 1985 to 2003. Mountain big sagebrush plants with poor vigor increased from 14% of the population in 1985 to 81% in 2008. Use of mountain big sagebrush was moderate-heavy in 1985 and 2008, and light-moderate in 1991, 1998, and 2003. Annual leader growth averaged 1.1 inches (2.8 cm) in 2003 and 0.7 inches (1.9 cm) in 2008.

Antelope bitterbrush provided 3% quadrat cover in 1998 and 2008 and 4% in 2003. Density decreased from 760 plants/acre in 1998 to 420 plants/acre in 2003 and 2008. Decadent bitterbrush plants were first sampled in 1991 at 29% of the population, decreased to 8% in 1998, and increased to 24% in 2003 and 2008. Young bitterbrush recruitment steadily declined from 38% of the population in 1985 to 0% in 2008. Vigor was good throughout the bitterbrush population until 2008, when 57% of the sampled plants displayed poor vigor. Use of bitterbrush was light-moderate in 1985 and 1998, and moderate-heavy in 1991, 2003, and 2008. Average annual leader growth was 4.0 inches (10.2 cm) in 2003 and 4.6 inches (11.8 cm) in 2008.

Combined pinyon pine (*Pinus edulis*) and Utah juniper (*Juniperus osteosperma*) canopy cover was 10% in 1998 and 32% in 2003 and 2008. Point-centered quarter data estimated pinyon density at 115 trees/acre in

1998 and approximately 120 trees/acre in 2003 and 2008. Average trunk diameter was 4.8 inches (12.2 cm) in 1998, 5.3 inches (13.5 cm) in 2003, and 8.2 inches (20.9 cm) in 2008. Juniper density was estimated at 213 trees/acre in 1998, 197 trees/acre in 2003, and 165 trees/acre in 2008. Average trunk diameter was 8.8 inches (22.4 cm) in 1998, 7.0 inches (17.8 cm) in 2003, and 11.2 inches (28.5 cm) in 2008.

Herbaceous Understory

Total grass cover was 11% in 1998 and 7% in 2003 and 2008. Bluebunch wheatgrass (*Agropyron spicatum*) is the most abundant grass, and has provided 68%-87% of the total grass cover since 1998. Sandberg bluegrass (*Poa secunda*), mutton bluegrass (*Poa fendleriana*), and bottlebrush squirreltail (*Sitanion hystrix*) are also abundant. Cheatgrass (*Bromus tectorum*) is present, but provides little cover.

The forb component has provided less than 1% cover since 1998, and is mostly composed of perennial species. Longleaf phlox (*Phlox longifolia*), sulfur eriogonum (*Eriogonum umbellatum*), desert phlox (*Phlox austromontana*), timber poisonvetch (*Astragalus convallarius*), and rockcress (*Arabis sp.*) have been present in most sample years.

1991 TREND ASSESSMENT

The browse trend is slightly down. Black sagebrush density remained stable at 2,265 plants/acre, but decadence remained very high and increased from 53% of the population to 77%. Young recruitment decreased from 9% of the population to 3%, and plants displaying poor vigor remained relatively stable at 21% of the population. Mountain big sagebrush density decreased from 1,400 plants/acre to 1,065 plants/acre, and decadence increased slightly from 57% of the population to 63%. Young recruitment also increased from 14% of the population to 31%, and plants displaying poor vigor increased from 14% of the population to 38%. Bitterbrush density decreased from 533 plants/acre to 466 plants/acre, and decadence increased from 0% of the population to 29%. Young recruitment remained high, but decreased from 38% of the population to 29%. Bitterbrush vigor remained excellent. The trend for grass is slightly up. The sum of nested frequency for perennial grasses increased 18%, and mutton bluegrass increased significantly in nested frequency. The trend for forbs is slightly up. The sum of nested frequency for perennial forbs increased slightly. The number of perennial species sampled increased from five to 10, and longleaf phlox increased significantly in nested frequency.

browse - slightly down (-1)

grass - slightly up (+1)

forb - slightly up (+1)

1998 TREND ASSESSMENT

The trend for browse is stable. Density differences of browse species may have been related to the larger sample area in 1998, therefore, the trend for browse was determined using other parameters. Black sagebrush decadence decreased from 77% of the population to 34%, and young recruitment slightly increased from 3% of the population to 6%. Plants displaying poor vigor decreased from 21% of the population to 9%. Mountain big sagebrush decadence remained very high at 67% of the population, and young recruitment decreased from 31% of the population to 9%. Plants displaying poor vigor remained relatively stable at 40%. Bitterbrush decadence decreased from 29% of the population to 8%, and young recruitment decreased from 29% of the population to 5%. Vigor remained good on most plants. The trend for grass is stable. The sum of nested frequency for perennial grasses increased 10%, and Sandberg bluegrass increased significantly in nested frequency. The trend for forbs is stable. The sum of nested frequency for perennial forbs decreased slightly. Rockcress decreased significantly in nested frequency. The winter range condition, determined by the Desirable Components Index (DCI), was rated as poor due to low preferred browse cover with high decadence and low recruitment, as well as low perennial forb cover.

winter range condition (DCI) - poor (42) Mid-level potential scale

browse - stable (0)

grass - stable (0)

forb - stable (0)

2003 TREND ASSESSMENT

The browse trend is down. Black sagebrush density decreased 12%, and decadence increased from 34% of the population to 53%. Young recruitment remained low at 2% of the population, and plants displaying poor vigor increased from 9% of the population to 18%. Mountain big sagebrush density decreased 24%, and decadence remained very high at 69% of the population. Young recruitment increased slightly from 9% of the population to 14%. Plants exhibiting poor vigor remained stable at 40% of the population. Bitterbrush density decreased 45%, and decadence increased from 8% of the population to 24%. Young recruitment remained stable at 5% of the population, and plant vigor remained good. The trend for grass is slightly down. The sum of nested frequency for perennial grasses decreased 21%. Mutton bluegrass and cheatgrass decreased significantly in nested frequency. The trend for forbs is stable. Few forbs were sampled. The DCI rating declined to very poor due to an increase in preferred browse decadence and a decrease in perennial herbaceous cover.

winter range condition (DCI) - very poor (31) Mid-level potential scale
browse - down (-2) grass - slightly down (-1) forb - stable (0)

2008 TREND ASSESSMENT

The trend for browse is down. Black sagebrush density decreased 35%, and decadence remained high at 49% of the population. No young plants were sampled. Plants displaying poor vigor increased from 18% of the population to 30%. Mountain big sagebrush density decreased 38%, and decadence increased from 69% of the population to 100%. No young plants were sampled. Plants displaying poor vigor increased from 40% of the population to 81%. Bitterbrush density remained stable at 420 plants/acre. Decadence also remained stable at 24% of the population, and no young plants were sampled. Vigor declined, with 57% of the population exhibiting poor vigor. The trend for grass is stable. The sum of nested frequency for perennial grasses increased 12%. The trend for forbs is stable. Few forbs were sampled. The DCI rating remained very poor.

winter range condition (DCI) - very poor (20) Mid-level potential scale
browse - down (-2) grass - stable (0) forb - stable (0)

HERBACEOUS TRENDS --
Management unit 23 , Study no: 1

Type	Species	Nested Frequency					Average Cover %		
		'85	'91	'98	'03	'08	'98	'03	'08
G	<i>Agropyron spicatum</i>	_b 227	_b 227	_{ab} 183	_a 160	_{ab} 181	7.78	5.59	5.96
G	<i>Bromus tectorum</i> (a)	-	-	_b 42	_a 15	_{ab} 22	.43	.03	.09
G	<i>Oryzopsis hymenoides</i>	4	12	12	5	-	.17	.04	-
G	<i>Poa fendleriana</i>	_a 6	_{bc} 36	_c 49	_{ab} 24	_{ab} 8	.98	.46	.08
G	<i>Poa secunda</i>	_a 3	_a 18	_b 94	_b 80	_b 112	2.00	.94	.67
G	<i>Sitanion hystrix</i>	_c 25	_{bc} 20	_{ab} 6	_a 2	_a 2	.01	.01	.00
Total for Annual Grasses		0	0	42	15	22	0.43	0.03	0.09
Total for Perennial Grasses		265	313	344	271	303	10.95	7.05	6.73
Total for Grasses		265	313	386	286	325	11.39	7.08	6.82
F	<i>Agoseris glauca</i>	_a -	_b 10	_{ab} 1	_a -	_a -	.00	-	-
F	<i>Arabis</i> sp.	_a -	_b 18	_a 1	_a 1	_a 4	.00	.00	.04
F	<i>Astragalus convallarius</i>	2	4	6	6	9	.15	.10	.13
F	<i>Calochortus nuttallii</i>	4	8	-	-	-	-	-	-
F	<i>Chaenactis douglasii</i>	-	-	1	-	-	.03	-	-
F	<i>Comandra pallida</i>	-	-	3	-	-	.03	-	-
F	<i>Collinsia parviflora</i> (a)	-	-	3	-	-	.00	-	-
F	<i>Crepis acuminata</i>	-	6	7	-	-	.06	-	-
F	<i>Eriogonum racemosum</i>	-	-	4	-	1	.03	-	.00
F	<i>Eriogonum umbellatum</i>	_a -	_{ab} 1	_b 9	_{ab} 5	_{ab} 7	.16	.07	.19
F	<i>Lomatium</i> sp.	-	-	1	-	-	.00	-	-
F	<i>Phlox austromontana</i>	-	6	4	6	7	.16	.15	.04
F	<i>Physaria chambersii</i>	1	4	-	-	-	-	-	-
F	<i>Phlox longifolia</i>	_a 8	_b 27	_{ab} 16	_a 6	_{ab} 19	.20	.02	.05
F	Unknown forb-perennial	3	1	-	-	-	-	-	-
Total for Annual Forbs		0	0	3	0	0	0.00	0	0
Total for Perennial Forbs		18	85	53	24	47	0.83	0.35	0.46
Total for Forbs		18	85	56	24	47	0.84	0.35	0.46

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

BROWSE TRENDS --

Management unit 23 , Study no: 1

Type	Species	Strip Frequency			Average Cover %		
		'98	'03	'08	'98	'03	'08
B	Artemisia nova	35	26	25	2.24	2.41	1.37
B	Artemisia tridentata vaseyana	40	26	22	2.54	.76	.09
B	Chrysothamnus depressus	1	0	0	.00	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	1	0	0	.15	-	-
B	Gutierrezia sarothrae	2	0	0	.00	-	-
B	Juniperus osteosperma	4	5	7	5.51	9.29	3.16
B	Opuntia sp.	1	2	2	.15	.00	.00
B	Pinus edulis	4	6	8	5.99	8.81	4.83
B	Purshia tridentata	18	15	15	3.20	4.31	2.75
Total for Browse		106	80	79	19.79	25.60	12.22

CANOPY COVER, LINE INTERCEPT --

Management unit 23 , Study no: 1

Species	Percent Cover		
	'98	'03	'08
Artemisia nova	-	1.85	2.20
Artemisia tridentata vaseyana	-	.55	.26
Juniperus osteosperma	7.19	23.31	21.35
Pinus edulis	2.59	8.94	10.43
Purshia tridentata	-	3.86	5.15

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 23 , Study no: 1

Species	Average leader growth (in)	
	'03	'08
Artemisia tridentata vaseyana	1.1	0.7
Purshia tridentata	4.0	4.6

POINT-QUARTER TREE DATA --

Management unit 23 , Study no: 1

Species	Trees per Acre		
	'98	'03	'08
Juniperus osteosperma	213	197	165
Pinus edulis	115	119	120

Average diameter (in)		
'98	'03	'08
8.8	7.0	11.2
4.8	5.3	8.2

BASIC COVER --

Management unit 23 , Study no: 1

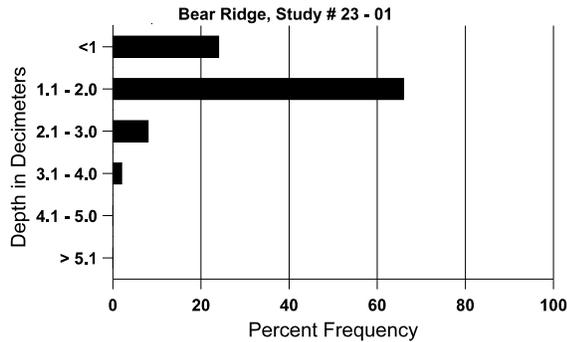
Cover Type	Average Cover %				
	'85	'91	'98	'03	'08
Vegetation	2.00	5.75	30.04	32.50	21.17
Rock	6.00	5.25	11.18	13.20	10.03
Pavement	30.50	24.25	26.32	19.74	29.97
Litter	46.50	46.50	42.49	37.44	44.00
Cryptogams	5.00	3.00	.93	3.45	2.77
Bare Ground	10.00	15.25	21.42	13.10	12.42

SOIL ANALYSIS DATA --

Management unit 23, Study no: 1, Study Name: Bear Ridge

Effective rooting depth (in)	Temp °F (depth)	pH	loam			%OM	PPM P	PPM K	ds/m
			%sand	%silt	%clay				
11.2	62.3 (12.7)	7.3	40.0	33.4	26.6	3.4	9.0	57.6	0.5

Stoniness Index



PELLET GROUP DATA --

Management unit 23 , Study no: 1

Type	Quadrat Frequency		
	'98	'03	'08
Rabbit	25	32	64
Elk	4	-	1
Deer	36	20	20
Cattle	-	-	-

Days use per acre (ha)		
'98	'03	'08
-	-	-
7 (17)	1 (3)	1 (3)
51 (125)	54 (134)	34 (83)
-	-	1 (2)

BROWSE CHARACTERISTICS --
Management unit 23 , Study no: 1

		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)
Artemisia nova												
85	2264	133	199	866	1199	-	50	47	53	3	24	13/21
91	2265	66	66	466	1733	-	32	24	77	5	21	9/16
98	1300	-	80	780	440	860	49	0	34	9	9	16/23
03	1140	-	20	520	600	880	9	0	53	18	18	15/25
08	740	-	-	380	360	500	8	19	49	22	30	14/22
Artemisia tridentata vaseyana												
85	1397	266	199	399	799	-	67	24	57	-	14	13/15
91	1065	333	333	66	666	-	19	6	63	11	38	12/13
98	1100	-	100	260	740	2300	56	2	67	27	40	15/23
03	840	-	120	140	580	1740	29	0	69	40	40	14/21
08	520	-	-	-	520	1520	23	54	100	73	81	12/20
Chrysothamnus depressus												
85	0	-	-	-	-	-	0	0	-	-	0	-/-
91	0	-	-	-	-	-	0	0	-	-	0	-/-
98	20	-	-	20	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	-/-
08	0	-	-	-	-	-	0	0	-	-	0	-/-
Chrysothamnus viscidiflorus viscidiflorus												
85	398	-	199	199	-	-	0	0	-	-	0	12/11
91	0	-	-	-	-	-	0	0	-	-	0	-/-
98	20	-	-	20	-	-	0	0	-	-	0	10/12
03	0	-	-	-	-	-	0	0	-	-	0	-/-
08	0	-	-	-	-	-	0	0	-	-	0	-/-
Gutierrezia sarothrae												
85	0	-	-	-	-	-	0	0	-	-	0	-/-
91	66	-	66	-	-	-	0	0	-	-	0	-/-
98	40	-	-	40	-	-	0	0	-	-	0	9/9
03	0	-	-	-	-	-	0	0	-	-	0	6/5
08	0	-	-	-	-	-	0	0	-	-	0	7/10

		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	265	66	66	199	-	-	0	0	-	-	0	69/64
91	332	66	133	199	-	-	20	40	-	-	20	152/98
98	80	40	40	40	-	-	0	0	-	-	0	-/-
03	100	-	60	40	-	-	0	0	-	-	0	-/-
08	140	-	60	80	-	-	0	14	-	-	14	-/-
Opuntia sp.												
85	0	-	-	-	-	-	0	0	-	-	0	-/-
91	0	-	-	-	-	-	0	0	-	-	0	-/-
98	60	20	40	20	-	-	0	0	-	-	0	8/12
03	40	-	-	40	-	-	0	0	-	-	0	6/14
08	60	-	-	60	-	-	0	0	-	-	0	6/27
Pinus edulis												
85	133	-	-	133	-	-	0	0	-	-	0	69/64
91	133	-	-	133	-	-	0	0	-	-	0	133/104
98	80	20	-	80	-	-	0	0	-	-	0	-/-
03	120	20	40	80	-	-	0	0	-	-	0	-/-
08	160	40	60	100	-	-	0	0	-	-	0	-/-
Purshia tridentata												
85	532	133	199	333	-	-	63	0	0	-	0	24/42
91	465	-	133	199	133	-	43	43	29	-	0	19/35
98	760	40	40	660	60	100	37	0	8	5	5	22/41
03	420	-	20	300	100	20	43	48	24	-	0	27/59
08	420	-	-	320	100	60	24	76	24	19	57	26/53
Tetradymia canescens												
85	66	-	-	66	-	-	100	0	-	-	0	7/4
91	0	-	-	-	-	-	0	0	-	-	0	-/-
98	0	-	-	-	-	-	0	0	-	-	0	-/-
03	0	-	-	-	-	-	0	0	-	-	0	-/-
08	0	-	-	-	-	-	0	0	-	-	0	-/-