Trend Study 5-4-06

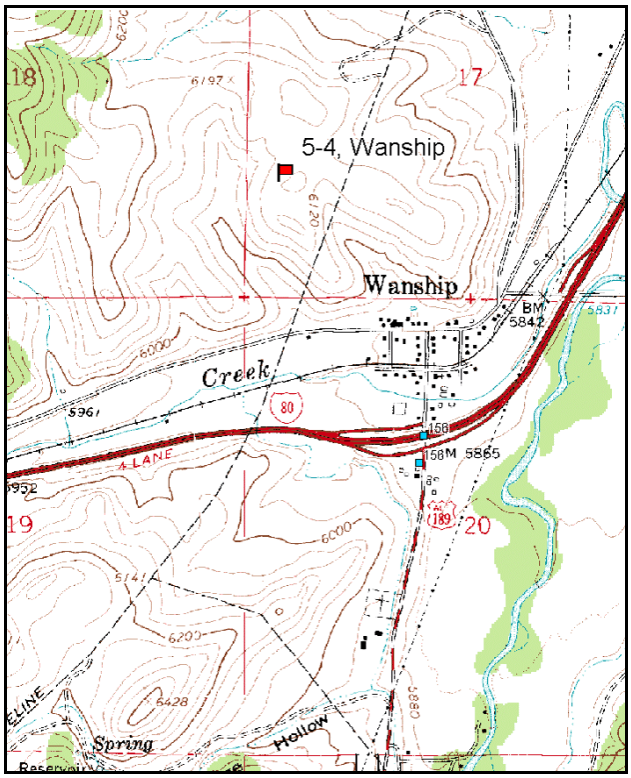
Study site name: Wanship . Vegetation type: Forage Kochia .

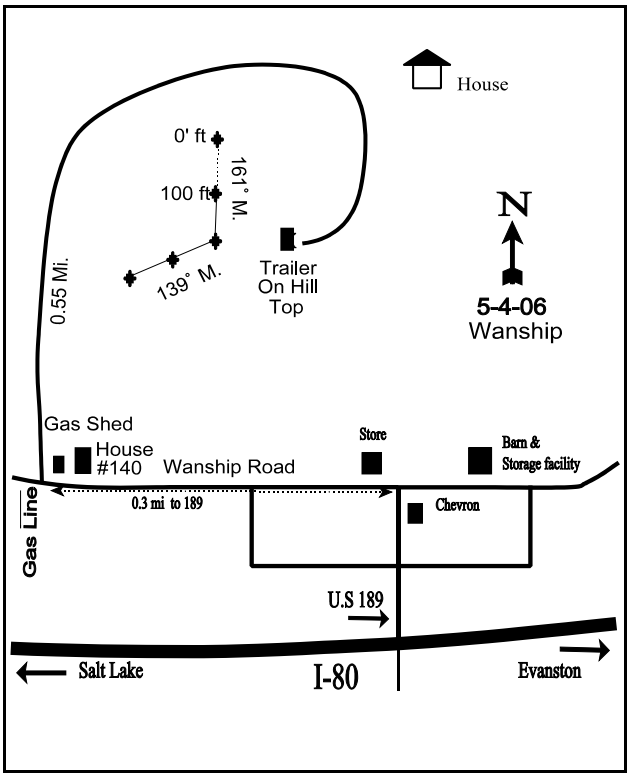
Compass bearing: frequency baseline 161 degrees magnetic.

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

LOCATION DESCRIPTION

From the I-80 overpass in Wanship (Exit 155), proceed north on 189 to the "T" junction in town with Buck's Chevron on the right. Turn left and go 0.3 miles. Turn right here and go up the draw 0.55 miles to a house on top of the hill. The owner of this home would like to be contacted when the site is read. From the fork in the road take a bearing of 220 degrees magnetic and walk 36 paces to the baseline. The 0-foot stake of the baseline is marked by browse tag #7955. The baseline runs 161 degrees magnetic. The baseline doglegs at the 200-foot baseline stake and runs 193 degrees magnetic.





Map Name: Wanship

Diagrammatic Sketch

Township 1N , Range 5E , Section 17

UTM NAD 27, UTM 12T 4518294 N 465163 E

DISCUSSION

Wanship - Trend Study No. 5-4

Study Information

This study samples an important winter range north of Wanship and west of the Weber River that is privately owned (elevation: 6,200 feet, slope: 3%, aspect: southwest). The site was established in 1984. A wildfire burned the entire area sometime after the 1990 reading and eliminated most of the browse, which was dominated by mountain big sagebrush. Deer use during the winter of 1983-84 was light because of deep crusted snow and deer were supplementary fed a pelleted ration alfalfa at feeding stations located along the frontage road near Wanship. There were numerous deer pellet groups encountered in 1996, indicating that deer still use the area. Quadrat frequency of deer pellet groups was moderately high at 36%. Some livestock sign was also apparent but likely from the previous fall. Gopher activity was noted. Pellet group transect data in 2001 was estimated at 67 deer, 24 elk, and 13 cow days use/acre (165 ddu/ha, 60 edu/ha, and 32 cdu/ha). In 2001, pellet quadrat frequency of deer was 34%, similar to 1996. The land owner said that there were nearly 50 deer wintering in the area and he counted over 100 elk on the ridge just west of the site during the 2000/2001 winter. He also said that cattle heavily graze the area later in the summer. In 2006, 14 elk and 96 deer days use/acre (35 edu/ha and 236 ddu/ha) were estimated from the pellet group transect data. In 2006, the deer pellet quadrat frequency had increased to 43%.

Soil

The soil is fairly deep but rocky on the surface. The soil series classification is Ayoub (USDA-NRCS, 2006). The effective rooting depth was estimated at only 9 inches, but it is likely deeper because mountain big sagebrush is present. The soil texture is a loam with a neutral pH of 6.6. The color is a dark reddish-gray, which is apparently derived from a basalt parent material. There is not much bare ground due to the abundant vegetation and litter cover. Erosion is minimal because of the gentle terrain and soil permeability. The soil erosion condition class was determined as stable in 2001 and 2006.

Browse

The key browse species are mountain big sagebrush and forage kochia. Sagebrush density was over 3,000 plants/acre in 1984 and 1990. A fire burned the site sometime after the 1990 reading and eliminated most of the sagebrush. It is unclear whether the burn was seeded with sagebrush or if it was seeded naturally. In 1996, the density of sagebrush was estimated at 2,880 plants/acre, 98% of which were young. The sagebrush use was light in 1996. Sagebrush density remained similar in 2001 at 2,500 plants/acre, but had decreased to 2,160 plants/acre in 2006. The majority of the population (94% in 2001 and 82% in 2006) has been made up of mature individuals. Vigor has been good and decadence low since the fire. In 2001 and 2006, use was moderate to high. Mature plants have been slowly increasing in height from 9 inches in 1996 to 12 inches in 2006. The average sagebrush leader growth in 2001 was 1.9 inches and 1.4 inches in 2006.

Forage kochia was seeded after the fire and has established well. The estimated density was 11,980 plants/acre in 1996, 11,500 plants/acre in 2001, and 5,980 plants/acre in 2006. All of the losses in density were in the mature and young age classes. It is likely that the forage kochia is either self-thinning or being out-competed by other species better adapted to the higher precipitation levels. Forage kochia is best adapted to areas receiving 6-16 inches of precipitation annually (Jensen et al. 2001). This study site is located in a region which receives an average annual precipitation of 16-18 inches (USDA et al. 1999). Mature plants measured 7 inches in height and 11 inches in width on average in 1996 and had changed little by 2006. Utilization was mostly light in 1996, but increased to light-moderate in 2001 and 2006. Antelope bitterbrush density was low in the past and all individuals were eliminated by the fire. Some white rubber rabbitbrush and stickyleaf low rabbitbrush have resprouted, but are not abundant. Other species encountered include Saskatoon serviceberry, broom snakeweed, pricklypear cactus, and gray horsebrush.

Herbaceous Understory

The seeded grasses established extremely well after the fire. These species included crested wheatgrass,

intermediate wheatgrass, and orchard grass. Crested wheatgrass has steadily, and significantly, increased every year in nested frequency. Crested wheatgrass cover has increased steadily to 21% in 2006. Perennial grass cover was 10% in 1996, 26% in 2001, and 31% in 2006. Native grasses, bluebunch wheatgrass and Sandberg bluegrass, persisted after the fire. Bluebunch wheatgrass has declined since the 1996 sampling, likely due to competition with seeded species. Sandberg bluegrass has increased since the fire and has sustained 6% cover. Other grasses include sheep fescue, bulbous bluegrass, and bottlebrush squirreltail. Cheatgrass was abundant in 1996, but declined significantly in nested frequency and cover in 2001 and remained low in 2006. Cheatgrass cover was 10% in 1996, decreased to less than 1% in 2001 and has remained unchanged.

Forbs are diverse but perennial species are deficient. Seeded Alfalfa and small burnet occur only occasionally, but were very robust and vigorous in 1996. Alfalfa was sampled in 1996 and 2001, but no small burnet was sampled after 1996. Alfalfa was not sampled in 2006, although some robust plants were present in the study area. Many small annual forbs have been sampled. Bur buttercup, pale alyssum, draba, and holosteum are the most abundant forb species.

1990 TREND ASSESSMENT

The browse trend is slightly down. The increased decadence and poor vigor of mountain big sagebrush and bitterbrush indicate a declining vegetation trend for this heavily utilized winter range. Virtually all the bitterbrush and 25% of the sagebrush have a heavily hedged growth form. Vigor is poor on many of the shrubs. There is limited reproduction. The grass trend is up with a 56% increase in the nested frequency of perennial grasses. There are large bare areas in the understory but less cheatgrass than observed on similar sites. The frequency of bluebunch wheatgrass is almost unchanged. The ground cover indicates a decrease in the amount of litter cover and an increase in bare soil. The nested frequency of perennial forbs decreased slightly.

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

1996 TREND ASSESSMENT

The fire that burned this site was beneficial to the mountain big sagebrush population. Decadence has decreased with nearly the same density as reported in the past. It is unclear at this point if the mountain big sagebrush was seeded or came from the existing seed bank. Most of the population (98%) was classified as young and vigor is excellent. Forage kochia is the most abundant browse species, with some moderate use. Increaser or invader browse species are in low abundance and do not appear to be expanding at this time. The browse trend is up. The grass trend is down. After the fire, the existing perennial grass species have decreased in nested frequency. Crested wheatgrass and intermediate wheatgrass, both of which compete well with cheatgrass, have established from the post-fire treatment. Had these two seeded species not established, the decrease in perennial grass nested frequency would have been greater. Cheatgrass nested frequency and cover are quite high, athough there are no 1990 annual grass data with which to compare. The forb trend is up. The sum of the nested frequency of perennial forbs increased substantially, half of which were seeded species. The sum of the nested frequency of annual forbs is very high, much of which is burr buttercup. The Desirable Components Index score is good due to moderate browse cover, low decadence, and excellent recruitment.

winter range condition (DC Index) - good (65) Mid-level potential scale
browse - up (+2) grass - down (-2) forb - up (+2)

2001 TREND ASSESSMENT

The trend for browse is slightly down. Mountain big sagebrush density decreased 13% since 1996, although most (94%) plants were mature. The density of young individuals was very low. Use was moderate to heavy but plants were vigorous and there were no decadent individuals. The dominant browse is still forage kochia, which provided 54% of the shrub cover and a stable density of 11,500 plants/acre. Use is heavier than in 1996, but vigor is normal. The grass trend is up. The sum of the nested frequency of perennial grasses

increased 96% and cheatgrass nested frequency decreased significantly. Sandberg bluegrass, crested wheatgrass, and intermediate wheatgrass nested frequencies all increased significantly. The forb trend is down. The sum of the nested frequency of perennial forbs decreased 33%. Small burnet was not sampled at all, spring parsley nested frequency decreased significantly, and alfalfa nested frequency decreased slightly. The nested frequency of annual forbs changed little. The Desirable Components Index score decreased to good to fair because of a decrease in browse cover and recruitment.

winter range condition (DC Index) - fair to good (64) Mid-level potential scale
browse - slightly down (-1) grass - up (+2) forb - down (-2)

2006 TREND ASSESSMENT

The browse trend is slightly down. Sagebrush density decreased by 14% and decadence increased from 0% to 8%. Very few young and seedlings were sampled. The forage kochia density decreased drastically, little more than half the number of the individuals sampled in 2001 were sampled in 2006. This decrease was mainly in the young and mature populations. Despite the large number of density losses, vigor remained excellent. The grass trend is stable. The sum of the nested frequency of perennial grass changed little and the nested frequency of cheatgrass increased slightly, but not significantly. The forb trend is stable. The nested frequencies of perennial and annual forbs changed little. The Desirable Components Index score decreased slightly to fair because of a decrease in browse cover, an increase in decadence, and a decrease in perennial forb cover.

winter range condition (DC Index) - fair (58) Mid-level potential scale
browse - slightly down (-1) grass - stable (0) forb - stable (0)

HERBACEOUS TRENDS --
Management unit 05 , Study no: 4

Type	Species	Nested Frequency					Average Cover %		
		'84	'90	'96	'01	'06	'96	'01	'06
G	Agropyron cristatum	a-	a-	b103	c192	d232	5.33	16.42	20.63
G	Agropyron dasystachyum	-	-	-	3	-	-	.03	-
G	Agropyron intermedium	a-	a-	b24	c79	c85	1.51	3.19	3.20
G	Agropyron spicatum	ab25	b27	b35	ab12	a10	1.13	.81	.68
G	Bromus tectorum (a)	-	-	b315	a55	a81	6.34	.28	.23
G	Dactylis glomerata	a-	a-	b11	a1	a3	.21	.03	.03
G	Festuca ovina	-	-	2	-	-	.00	-	-
G	Poa bulbosa	a-	a-	a1	a4	19	.03	.01	.22
G	Poa secunda	b187	d307	a92	c235	bc218	2.00	5.69	5.72
G	Sitanion hystrix	b15	b21	a1	a1	a-	.00	.01	-
Total for Annual Grasses		0	0	315	55	81	6.34	0.28	0.23
Total for Perennial Grasses		227	355	269	527	567	10.24	26.19	30.50
Total for Grasses		227	355	584	582	648	16.58	26.47	30.73

Type	Species	Nested Frequency					Average Cover %		
		'84	'90	'96	'01	'06	'96	'01	'06
F	Allium acuminatum	$_{b}$18	$_{ab}$5	$_{a}$-	$_{b}$16	$_{c}$40	-	.03	.20
F	Alyssum alyssoides (a)	-	-	$_{c}$188	$_{b}$141	$_{a}$91	1.45	.63	.21
F	Antennaria rosea	6	5	-	-	-	-	-	-
F	Arabis sp.	-	3	-	-	2	-	-	.03
F	Astragalus cibarius	-	-	1	3	8	.00	.18	.11
F	Astragalus convallarius	-	-	-	4	-	-	.01	-
F	Astragalus utahensis	7	1	11	-	-	.21	-	-
F	Cirsium sp.	-	-	3	-	-	.00	-	-
F	Collomia linearis (a)	-	-	1	2	-	.00	.00	-
F	Comandra pallida	-	-	-	4	-	-	.03	-
F	Collinsia parviflora (a)	-	-	$_{a}$3	$_{b}$76	$_{c}$130	.01	.32	.48
F	Crepis acuminata	-	2	-	1	-	-	.15	-
F	Cryptantha sp.	6	-	-	-	-	-	-	-
F	Cymopterus longipes	$_{a}$-	$_{a}$10	$_{c}$54	$_{b}$32	$_{ab}$28	.49	.21	.25
F	Draba sp. (a)	-	-	$_{a}$-	$_{b}$105	$_{c}$168	-	.41	.79
F	Epilobium brachycarpum (a)	-	-	-	2	6	-	.00	.01
F	Erodium cicutarium (a)	-	-	-	1	-	-	.03	-
F	Erigeron pumilus	2	3	1	-	-	.03	-	-
F	Gayophytum ramosissimum(a)	-	-	$_{b}$14	$_{a}$-	$_{a}$4	.03	-	.03
F	Holosteum umbellatum (a)	-	-	$_{b}$213	$_{b}$185	$_{a}$136	1.45	.76	.53
F	Lupinus argenteus	-	-	-	5	-	-	.18	-
F	Medicago sativa	$_{a}$-	$_{a}$-	$_{b}$18	$_{ab}$10	$_{a}$-	.82	.95	.44
F	Microsteris gracilis (a)	-	-	-	3	7	-	.03	.01
F	Penstemon sp.	3	-	-	-	-	-	-	-
F	Phlox longifolia	$_{a}$-	$_{a}$-	$_{b}$25	$_{ab}$10	$_{ab}$9	.29	.07	.01
F	Polygonum douglasii (a)	-	-	3	-	1	.00	-	.00
F	Ranunculus testiculatus (a)	-	-	$_{b}$263	$_{a}$217	$_{b}$264	2.44	2.87	2.50
F	Sanguisorba minor	$_{a}$-	$_{a}$-	$_{b}$16	$_{a}$-	$_{a}$-	1.29	-	-
F	Schoencrambe linifolia	-	-	3	1	-	.03	.00	-
F	Sisymbrium altissimum (a)	-	-	1	-	-	.03	-	-
F	Tragopogon dubius	4	-	3	5	-	.03	.03	-
Total for Annual Forbs		0	0	686	732	807	5.44	5.07	4.59
Total for Perennial Forbs		46	29	135	91	87	3.20	1.86	1.05
Total for Forbs		46	29	821	823	894	8.65	6.94	5.64

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

BROWSE TRENDS --
Management unit 05 , Study no: 4

Type	Species	Strip Frequency			Average Cover %		
		'96	'01	'06	'96	'01	'06
B	Artemisia tridentata vaseyana	58	52	49	1.08	2.00	2.19
B	Chrysothamnus nauseosus albicaulis	3	3	1	-	.03	-
B	Chrysothamnus viscidiflorus viscidiflorus	27	27	32	2.05	1.51	1.23
B	Gutierrezia sarothrae	1	3	1	-	.15	-
B	Kochia prostrata	95	95	79	7.61	4.27	1.92
B	Opuntia sp.	3	3	3	.15	-	.41
B	Tetradymia canescens	1	1	2	-	-	-
Total for Browse		188	184	167	10.89	7.97	5.76

CANOPY COVER, LINE INTERCEPT --
Management unit 05 , Study no: 4

Species	Percent Cover '06
Artemisia tridentata vaseyana	2.70
Chrysothamnus viscidiflorus viscidiflorus	1.08
Kochia prostrata	2.33
Opuntia sp.	.16
Tetradymia canescens	.28

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 05 , Study no: 4

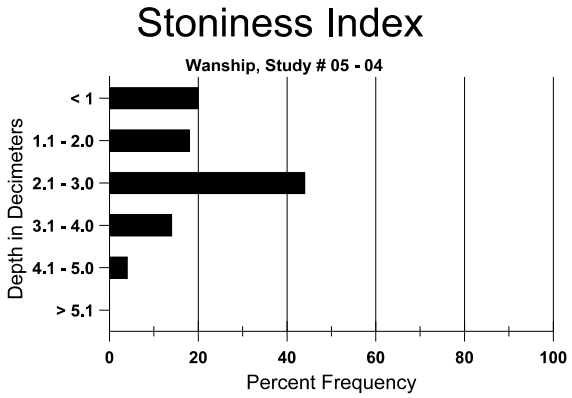
Species	Average leader growth (in)	
	'01	'06
Artemisia tridentata vaseyana	1.9	1.4

BASIC COVER --
Management unit 05 , Study no: 4

Cover Type	Average Cover %				
	'84	'90	'96	'01	'06
Vegetation	3.00	15.75	37.70	44.98	38.54
Rock	9.00	9.00	11.57	9.17	10.86
Pavement	16.25	14.75	3.39	2.23	5.23
Litter	64.00	41.00	44.87	27.26	36.85
Cryptogams	.25	5.25	.47	.86	1.64
Bare Ground	7.50	14.25	11.60	24.70	21.86

SOIL ANALYSIS DATA --
Herd Unit 05, Study no: 04, Wanship

Effective rooting depth (in)	Temp °F (depth)	PH	Loam			%0M	PPM P	PPM K	dS/m
			%sand	%silt	%clay				
9.2	78.0 (8.3)	6.6	44.9	28.7	23.4	2.7	15.4	185.6	0.5



PELLET GROUP DATA --
Management unit 05 , Study no: 4

Type	Quadrat Frequency			Days use per acre (ha)	
	'96	'01	'06	'01	'06
Sheep	2	-	-	-	-
Rabbit	10	-	8	-	-
Elk	3	9	22	24 (60)	14 (35)
Deer	36	34	43	67 (165)	96 (236)
Cattle	1	1	2	13 (32)	-

BROWSE CHARACTERISTICS --
Management unit 05 , Study no: 4

		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 alnifolia												
84	**0**	-	-	-	-	-	0	0	-	-	0	-/-
90	**0**	-	-	-	-	-	0	0	-	-	0	-/-
96	**0**	-	-	-	-	-	0	0	-	-	0	24/28
01	**0**	-	-	-	-	-	0	0	-	-	0	-/-
06	**0**	-	-	-	-	-	0	0	-	-	0	23/28
Artemisia tridentata vaseyana												
84	**3532**	833	300	1466	1766	-	36	61	50	5	10	33/43
90	**3066**	133	233	933	1900	-	53	25	62	10	25	26/36
96	**2880**	40	2820	60	-	560	0	0	0	-	0	9/9
01	**2500**	-	140	2360	-	-	38	55	0	-	2	11/13
06	**2160**	-	200	1780	180	100	33	28	8	3	3	12/17
Chrysothamnus nauseosus albicaulis												
84	**0**	-	-	-	-	-	0	0	0	-	0	-/-
90	**0**	-	-	-	-	-	0	0	0	-	0	-/-
96	**60**	-	-	60	-	-	0	0	0	-	0	13/14
01	**60**	-	-	40	20	-	33	0	33	-	0	21/17
06	**20**	-	-	20	-	20	0	0	0	-	0	21/26
Chrysothamnus viscidiflorus viscidiflorus												
84	**599**	-	333	266	-	-	0	0	0	-	0	13/12
90	**1065**	-	33	766	266	-	16	3	25	6	63	11/12
96	**820**	-	-	820	-	20	0	0	0	-	0	12/22
01	**720**	-	40	560	120	20	3	0	17	3	3	12/22
06	**800**	-	60	640	100	-	3	3	13	5	5	12/17
Gutierrezia sarothrae												
84	**0**	-	-	-	-	-	0	0	0	-	0	-/-
90	**0**	-	-	-	-	-	0	0	0	-	0	-/-
96	**20**	-	-	20	-	-	0	0	0	-	0	8/11
01	**100**	-	-	80	20	20	0	0	20	20	20	7/11
06	**40**	-	20	20	-	-	0	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)
Kochia prostrata												
84	**0**	-	-	-	-	-	0	0	0	-	0	-/-
90	**0**	-	-	-	-	-	0	0	0	-	0	-/-
96	**11980**	40	3300	8640	40	-	9	0	0	-	.16	7/11
01	**11500**	60	1760	9700	40	20	56	10	0	-	0	6/9
06	**5980**	780	960	5000	20	40	31	19	0	.33	.33	7/9
Opuntia sp.												
84	**33**	-	33	-	-	-	0	0	0	-	0	-/-
90	**365**	-	66	166	133	-	0	0	36	22	36	3/10
96	**120**	-	40	80	-	-	0	0	0	-	0	4/8
01	**80**	-	20	60	-	-	0	0	0	-	0	5/11
06	**100**	-	20	80	-	-	0	0	0	-	0	5/15
Purshia tridentata												
84	**133**	-	-	133	-	-	0	100	0	-	0	29/40
90	**33**	-	-	-	33	-	0	100	100	61	100	-/-
96	**0**	-	-	-	-	-	0	0	0	-	0	-/-
01	**0**	-	-	-	-	-	0	0	0	-	0	-/-
06	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Tetradymia canescens												
84	**0**	-	-	-	-	-	0	0	-	-	0	-/-
90	**0**	-	-	-	-	-	0	0	-	-	0	-/-
96	**20**	-	-	20	-	-	0	0	-	-	0	11/18
01	**20**	-	-	20	-	-	0	0	-	-	0	12/34
06	**40**	-	-	40	-	-	0	0	-	-	0	17/18