

Trend Study 21A-1-03

Study site name: Long Canyon .

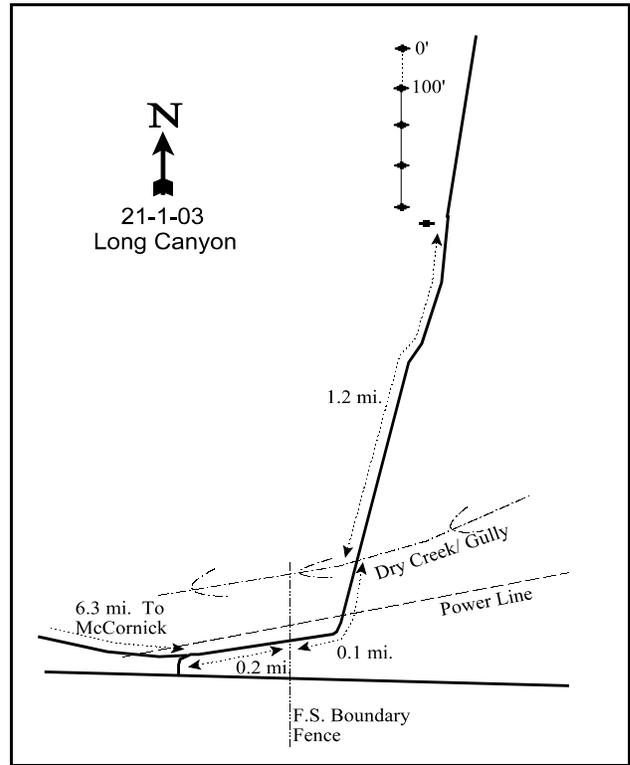
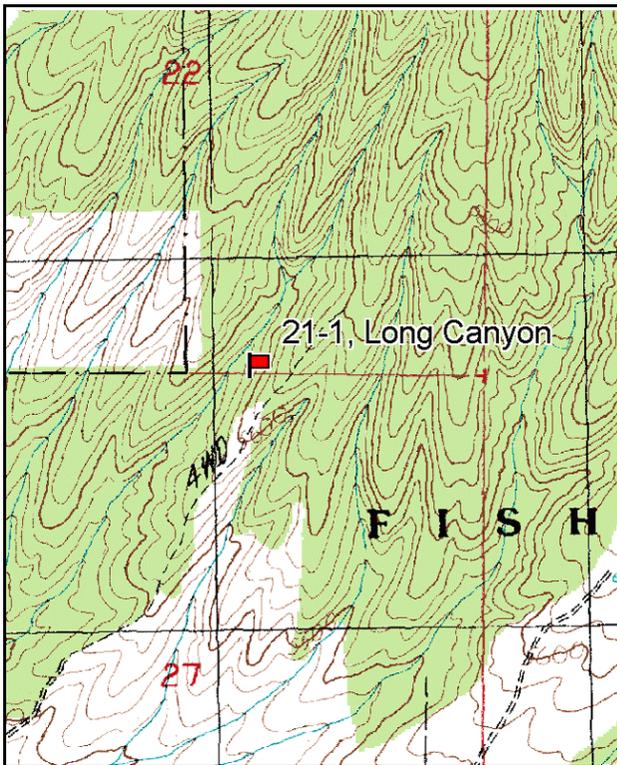
Vegetation type: Stansbury Cliffrose .

Compass bearing: frequency baseline 180 degrees magnetic.

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

LOCATION DESCRIPTION

Take Exit 178 off of I-15 near Holden and travel on highway 50 to McCornick. Turn right at 11700 N. and travel east along the powerline road for ~6.3 miles to a fork. Take the left fork and travel 0.2 miles to the forest boundary line. From the forest boundary line, travel 0.1 miles to a dry creek. From the dry creek, drive 1.2 miles to the witness post (2ft rebar marked by tag # 7068) on the left side of the road. The 400' stake is down the hill 50 feet at 0° magnetic. The 0' stake is marked by browse tag # 7069.



Map Name: Holden

Diagrammatic Sketch

Township 18S, Range 4W, Section 22

GPS: NAD 27, UTM 12S 4342674 N, 389095 E

DISCUSSION

Long Canyon - Trend Study No. 21-1

The Long Canyon study is located on the southern end of the Canyon Mountains on Forest Service land. The transect is located on a moderately steep (27-30%), northwest facing slope at an elevation of 5,600 feet. Some of the surrounding area was burned by wildfire in 1981, with a large area to the west having been chained and seeded. The ridge where the trend study is located supports an open stand of mature Utah junipers and Stansbury cliffrose in association with a sagebrush-grass understory. The original baseline is located on a northwest aspect near the bottom of a draw. Juniper density is higher near the bottom of the draw and the key browse species, cliffrose and Wyoming big sagebrush, are not as abundant. The old density plots were placed near the top of the ridge on a more westerly aspect where juniper is more scattered and density of sagebrush and cliffrose is higher. In 1998, the original 100 foot frequency baseline was left in place and extended to 400 feet. Three of the 5 belts sample the more northwestern slope with a higher juniper density while the last 2 belts sample the more open ridge top. A nearby DWR Pellet group transect showed low deer use in this area between 1980 and 1991 (Jense et al. 1985, 1991). A pellet group transect read by range trend personnel parallel to the sampling baseline estimated 10 deer days use/acre (25 ddu/ha) in 1998 and only 1 deer day use/acre (3 ddu/ha) in 2003. Cattle use was estimated at 24 cow days use/acre (59 cdu/ha) in 1998, decreasing to 3 days use/acre (7 cdu/ha) in 2003.

Soil on the site is very rocky and moderately shallow. Effective rooting depth was estimated at just under 11 inches in 1998. Soils are loam in texture and neutral in reactivity (pH of 7.0). Phosphorus may be limiting to plant growth at only 3.2 ppm where 10 ppm is thought to be the minimum required for normal growth. Due to the rocky nature of the soil, average soil temperature was moderately high at 72°F at a depth of 14 inches in August of 1998. Soil temperature was resampled in May of 2003, averaging 55.4°F at 13 inches in depth. The large difference in average soil temperature between years is due to the time of sampling and soil moisture. Soil moisture is much higher in May compared to September which accounts for most of the difference. There is evidence of erosion on the scattered exposed patches of bare soil, but an erosion condition class assessment done in 2003 showed soils to be stable on the site.

Utah juniper and Stansbury cliffrose dominate the ridge. Point quarter data estimated a density of 225 juniper trees/acre with an average diameter of 6 inches in 2003. Juniper are more numerous along the original baseline than on the ridge top, but overhead canopy cover averages less than 5% over the whole site. Most of the junipers range from 4 to 12 feet in height. Some of the juniper on the ridge top have been chained with some tipped trees still alive. Cliffrose and big sagebrush are the key browse species. Density of cliffrose has remained fairly steady, averaging about 400 plants/acre over the last 2 readings. Browsing by deer has been mostly light during all readings. Mature cliffrose average 6 feet in height resulting in many plants being partly unavailable to browsing animals. Vigor was rated as generally good for cliffrose from 1985 to 1998, but in 2003, 41% of the population displayed poor vigor. Percent decadence has steadily increased from 0% in 1985 to 45% in 2003. Reproduction has been absent in all sampling years with the exception of 1998, when a few seedling and young cliffrose were sampled. Density of Wyoming big sagebrush declined by 84% between 1991 and 1998. With relatively few dead plants being sampled, most of this change is due to the much larger, more representative sample giving more accurate density estimates in 1998 and 2003. Sagebrush has displayed light to moderate use in all years, with the highest level coming in 1991. Poor vigor and decadence in the sagebrush population were within acceptable levels from 1985 to 1998, but both of these parameters showed marked increases in 2003. Half of the sagebrush were classified as decadent in 2003, with nearly one-third of the population displaying poor vigor characteristics. Annual leader growth on sagebrush and cliffrose was minimal in 2003 at 1 inch and 1.6 inches respectively. The undesirable increaser, broom snakeweed, showed an 89% decline in density in 2003.

The herbaceous understory, especially the grass component, is relatively abundant for a Wyoming big sagebrush type. Bluebunch wheatgrass and Sandberg bluegrass are both present in moderately high numbers. In 2003, bluebunch wheatgrass remained at stable in frequency and cover values, while Sandberg bluegrass significantly increased in nested frequency and increased in average cover. Cheatgrass was fairly abundant in 1998, but significantly declined by 2003. The forb component is minimal at this site. Sego lily was the most abundant forb in 2003 being sampled in 21% of the quadrats.

1985 APPARENT TREND ASSESSMENT

Soil trend appears stable with erosion being localized and good ground cover over most of the area. Soil loss could be accelerated by an increase in junipers which tend to exclude other more desirable species. The vegetative trend appears stable to slightly declining. The key species, Wyoming big sagebrush and cliffrose, have little reproduction and only fair vigor. Junipers, prickly phlox, broom snakeweed, and rock goldenrod all appear to be increasing.

1991 TREND ASSESSMENT

Soil trend is slightly downward at this time. Pavement and litter cover values are decreasing while rock and bare ground cover values have doubled. This trend should be closely monitored. The Wyoming big sagebrush population has increased by 6%, with an accompanying increase for decadency which should turn around with the end to the extended drought. Stansbury cliffrose density remains unchanged, but percent decadence has increased from 0% to 20%. This should also turn around with normal precipitation. Browse trend is stable. The herbaceous understory has a slightly upward trend. Both perennial grass species have remained at stable nested frequencies since 1985, while nested frequency values for perennial forbs more than doubled.

TREND ASSESSMENT

soil - slightly downward (2)

browse - stable for key species (3)

herbaceous understory - up slightly (4)

1998 TREND ASSESSMENT

Trend for soil appears to be stable. Percent bare ground has declined slightly from 15% to 10%, but litter cover has also declined. Erosion does not currently present a serious problem. Trend for the key browse species is stable. Density estimates have remained similar since 1985 with mostly light use. Percent decadence has increased since 1991. However, reproduction is evident this year as seedling and young plants were encountered in adequate densities to maintain the population. Mature cliffrose are becoming increasingly less available due to height. Density of Wyoming big sagebrush has declined 84%, due mostly to the much larger sample size giving more accurate density estimates. The original frequency baseline sampled a northwest facing slope which supported a greater density of juniper and few sagebrush plants. The old density plots were placed along the top of the ridge which had a greater density of big sagebrush. The new sample estimates sagebrush density along a 400 ft baseline which includes the original 100 foot frequency baseline and extends to the top of the ridge where the old density plots were located. In addition, dead sagebrush are rare and percent decadence is moderately low at only 22%. The whole study should have been placed on the more open ridge top in 1985. Trend for the herbaceous understory appears stable. Sum of nested frequency values for perennial grasses remained stable between 1991 and 1998. Grasses account for 85% of the herbaceous cover. Sum of nested frequency of forbs declined since 1991, but some of the change is likely due to the larger sample used in 1998.

TREND ASSESSMENT

soil - stable (3)

browse - stable for key species (3)

herbaceous understory - stable (3)

2003 TREND ASSESSMENT

Soil trend is stable. With drier than normal conditions for several years preceding the 2003 reading, bare ground increased and litter cover decreased. However, an erosion condition class assessment showed soils to be stable in 2003. The herbaceous vegetation, primarily perennial grasses, retained stable frequency and cover values in 2003. Trend for browse is slightly down. The key species, cliffrose and Wyoming big sagebrush, both show increases in poor vigor and decadence. Reproduction for both species is absent in 2003. These trends should improve with higher precipitation in the future. Trend for the herbaceous understory is stable. Sandberg bluegrass significantly increased in nested frequency while bluebunch wheatgrass remained stable. Sum of nested frequency for perennial forbs slightly declined with forbs remaining a minor component at this site.

TREND ASSESSMENT

soil - stable (3)

browse - slightly down (2)

herbaceous understory - stable (3)

HERBACEOUS TRENDS --

Management unit 21 , Study no: 1

| Type | Species | Nested Frequency | | | | Average Cover % | |
|-----------------------------|--------------------------|------------------|-------------------|------------------|------------------|-----------------|-------|
| | | '85 | '91 | '98 | '03 | '98 | '03 |
| G | Agropyron cristatum | - | - | 3 | - | .03 | .00 |
| G | Agropyron spicatum | 181 | 169 | 173 | 187 | 4.38 | 4.59 |
| G | Bromus tectorum (a) | - | - | _b 95 | _a 19 | 4.27 | .05 |
| G | Poa secunda | _a 218 | _{ab} 265 | _a 247 | _b 286 | 6.96 | 8.81 |
| Total for Annual Grasses | | 0 | 0 | 95 | 19 | 4.27 | 0.05 |
| Total for Perennial Grasses | | 399 | 434 | 423 | 473 | 11.38 | 13.41 |
| Total for Grasses | | 399 | 434 | 518 | 492 | 15.66 | 13.46 |
| F | Antennaria rosea | - | - | - | 1 | - | .00 |
| F | Arabis spp. | _b 11 | _b 13 | _{ab} 10 | _a - | .02 | - |
| F | Arenaria fendleri | _a - | _b 12 | _{ab} 6 | _a - | .06 | - |
| F | Astragalus spp. | _a 6 | _b 42 | _a 2 | _a 3 | .00 | .00 |
| F | Calochortus nuttallii | _a 5 | _a - | _a - | _b 51 | - | .13 |
| F | Collinsia parviflora (a) | - | - | 1 | - | .00 | - |
| F | Cryptantha spp. | - | 4 | - | - | - | - |
| F | Descurainia pinnata (a) | - | - | - | 2 | - | .01 |
| F | Draba spp. (a) | - | - | _b 15 | _a - | .03 | - |

| T y p e | Species | Nested Frequency | | | | Average Cover % | |
|---------------------------|-----------------------------|------------------|-----|------|-----|--------------------|------|
| | | '85 | '91 | '98 | '03 | '98 | '03 |
| F | Eriogonum spp. | - | 1 | - | - | - | - |
| F | Gilia spp. (a) | - | - | a- | b19 | - | .03 |
| F | Lactuca serriola | - | 3 | - | - | - | - |
| F | Petradoria pumila | bc47 | c69 | ab25 | a22 | .91 | .25 |
| F | Physaria chambersii | b19 | b15 | a- | a- | - | - |
| F | Phlox hoodii | a4 | c99 | b68 | a16 | 1.31 | .09 |
| F | Phlox longifolia | 4 | - | - | - | - | - |
| F | Ranunculus testiculatus (a) | - | - | 2 | - | .00 | - |
| F | Streptanthus cordatus | a11 | b41 | ab24 | a17 | .30 | .03 |
| Total for Annual Forbs | | 0 | 0 | 18 | 21 | 0.03 | 0.04 |
| Total for Perennial Forbs | | 107 | 299 | 135 | 110 | 2.62 | 0.52 |
| Total for Forbs | | 107 | 299 | 153 | 131 | 2.66 | 0.57 |

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

BROWSE TRENDS --

Management unit 21 , Study no: 1

| T y p e | Species | Strip Frequency | | Average Cover % | |
|------------------|---|--------------------|-----|--------------------|-------|
| | | '98 | '03 | '98 | '03 |
| B | Artemisia nova | 2 | 2 | - | - |
| B | Artemisia tridentata wyomingensis | 7 | 7 | .57 | .68 |
| B | Cercocarpus montanus | 0 | 0 | - | .15 |
| B | Chrysothamnus viscidiflorus stenophyllus | 24 | 26 | 1.11 | 1.04 |
| B | Cowania mexicana stansburiana | 16 | 16 | 4.29 | 4.45 |
| B | Gutierrezia sarothrae | 22 | 4 | .45 | .03 |
| B | Juniperus osteosperma | 10 | 11 | 4.38 | 10.31 |
| B | Leptodactylon pungens | 13 | 12 | .47 | .04 |
| B | Mahonia repens | 1 | 0 | - | - |
| B | Purshia tridentata | 0 | 1 | - | - |
| Total for Browse | | 95 | 79 | 11.28 | 16.72 |

CANOPY COVER, LINE INTERCEPT --

Management unit 21 , Study no: 1

| Species | Percent Cover | |
|--|---------------|------|
| | '98 | '03 |
| Artemisia tridentata wyomingensis | - | 1.36 |
| Chrysothamnus viscidiflorus stenophyllus | - | .65 |
| Cowania mexicana stansburiana | - | 6.40 |
| Juniperus osteosperma | 4.59 | 2.91 |

KEY BROWSE ANNUAL LEADER GROWTH --

Management unit 21 , Study no: 1

| Species | Average leader growth (in) |
|-----------------------------------|----------------------------|
| | '03 |
| Artemisia tridentata wyomingensis | 1.0 |
| Cowania mexicana stansburiana | 1.6 |

POINT-QUARTER TREE DATA --

Management unit 21 , Study no: 1

| Species | Trees per Acre | |
|-----------------------|----------------|-----|
| | '98 | '03 |
| Juniperus osteosperma | 260 | 225 |

| Average diameter (in) | |
|-----------------------|-----|
| '98 | '03 |
| 5.1 | 5.9 |

BASIC COVER --

Management unit 21 , Study no: 1

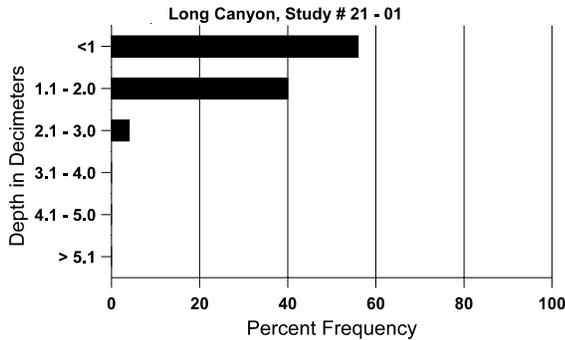
| Cover Type | Average Cover % | | | |
|-------------|-----------------|-------|-------|-------|
| | '85 | '91 | '98 | '03 |
| Vegetation | 7.25 | 6.50 | 34.20 | 29.28 |
| Rock | 5.50 | 13.00 | 6.01 | 7.22 |
| Pavement | 27.75 | 18.00 | 26.99 | 26.06 |
| Litter | 51.50 | 45.50 | 39.52 | 32.47 |
| Cryptogams | 1.00 | 2.50 | 5.43 | 4.02 |
| Bare Ground | 7.00 | 14.50 | 10.39 | 19.72 |

SOIL ANALYSIS DATA --

Management unit 21, Study no: 1, Study Name: Long Canyon

| Effective rooting depth (in) | Temp °F (depth) | pH | % sand | % silt | % clay | % OM | PPM P | PPM K | ds/m |
|------------------------------|-----------------|-----|--------|--------|--------|------|-------|-------|------|
| 10.6 | 55.4 (13.0) | 7.0 | 45.3 | 29.4 | 25.3 | 3.0 | 3.2 | 99.2 | 0.7 |

Stoniness Index



PELLET GROUP DATA --

Management unit 21, Study no: 1

| Type | Quadrat Frequency | | Days use per acre (ha) | |
|--------|-------------------|-----|------------------------|--------|
| | '98 | '03 | '98 | '03 |
| Rabbit | 27 | 24 | - | - |
| Elk | - | 1 | - | - |
| Deer | 6 | 4 | 10 (25) | 2 (17) |
| Cattle | 5 | 3 | 24 (59) | 3 (7) |

BROWSE CHARACTERISTICS --

Management unit 21, Study no: 1

| | | Age class distribution (plants per acre) | | | | | Utilization | | | | |
|----------------|---------------------------------------|--|-------|--------|----------|------|-------------|---------|------------|--------------|---------------------------|
| Year | Plants per Acre (excluding seedlings) | Seedling | Young | Mature | Decadent | Dead | % moderate | % heavy | % decadent | % poor vigor | Average Height Crown (in) |
| Artemisia nova | | | | | | | | | | | |
| 85 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 91 | 66 | - | - | 66 | - | - | 100 | 0 | - | 0 | 14/21 |
| 98 | 40 | - | - | 40 | - | - | 0 | 0 | - | 0 | 29/37 |
| 03 | 40 | - | - | 40 | - | - | 0 | 0 | - | 0 | 15/23 |

| | | Age class distribution (plants per acre) | | | | | Utilization | | | | |
|---|---------------------------------------|--|-------|--------|----------|------|-------------|---------|------------|--------------|---------------------------|
| Year | Plants per Acre (excluding seedlings) | Seedling | Young | Mature | Decadent | Dead | % moderate | % heavy | % decadent | % poor vigor | Average Height Crown (in) |
| <i>Artemisia tridentata wyomingensis</i> | | | | | | | | | | | |
| 85 | 1065 | - | 66 | 933 | 66 | - | 38 | 0 | 6 | 13 | 32/27 |
| 91 | 1132 | - | 266 | 600 | 266 | - | 65 | 0 | 23 | 12 | 31/32 |
| 98 | 180 | - | - | 140 | 40 | 80 | 33 | 0 | 22 | 11 | 25/35 |
| 03 | 200 | - | - | 100 | 100 | 120 | 10 | 0 | 50 | 30 | 27/40 |
| <i>Chrysothamnus viscidiflorus stenophyllus</i> | | | | | | | | | | | |
| 85 | 933 | - | - | 133 | 800 | - | 0 | 0 | 86 | 21 | 8/13 |
| 91 | 1799 | - | - | 533 | 1266 | - | 4 | 4 | 70 | 41 | 15/18 |
| 98 | 640 | - | - | 580 | 60 | 100 | 0 | 0 | 9 | 0 | 14/17 |
| 03 | 600 | - | - | 240 | 360 | 340 | 0 | 0 | 60 | 53 | 12/19 |
| <i>Cowania mexicana stansburiana</i> | | | | | | | | | | | |
| 85 | 333 | - | - | 333 | - | - | 0 | 0 | 0 | 0 | 55/37 |
| 91 | 332 | - | - | 266 | 66 | - | 20 | 0 | 20 | 0 | 63/59 |
| 98 | 360 | 20 | 40 | 200 | 120 | - | 11 | 0 | 33 | 6 | 73/78 |
| 03 | 440 | - | - | 240 | 200 | 40 | 9 | 5 | 45 | 41 | 73/76 |
| <i>Gutierrezia sarothrae</i> | | | | | | | | | | | |
| 85 | 799 | 200 | 266 | 400 | 133 | - | 0 | 0 | 17 | 0 | 9/7 |
| 91 | 999 | - | 66 | 733 | 200 | - | 0 | 0 | 20 | 7 | 10/9 |
| 98 | 740 | - | 20 | 720 | - | - | 0 | 0 | 0 | 0 | 12/15 |
| 03 | 80 | - | - | 40 | 40 | 220 | 0 | 0 | 50 | 50 | 6/7 |
| <i>Juniperus osteosperma</i> | | | | | | | | | | | |
| 85 | 133 | - | - | 133 | - | - | 0 | 0 | - | 0 | 64/41 |
| 91 | 133 | - | - | 133 | - | - | 0 | 0 | - | 0 | 90/64 |
| 98 | 200 | 40 | 80 | 120 | - | 20 | 0 | 0 | - | 0 | -/- |
| 03 | 220 | - | 20 | 200 | - | - | 0 | 0 | - | 0 | -/- |
| <i>Leptodactylon pungens</i> | | | | | | | | | | | |
| 85 | 6665 | 666 | 1733 | 3466 | 1466 | - | 4 | 4 | 22 | 2 | 3/5 |
| 91 | 199 | - | - | 133 | 66 | - | 0 | 0 | 33 | 67 | 10/14 |
| 98 | 560 | - | 40 | 340 | 180 | 180 | 0 | 0 | 32 | 21 | 7/9 |
| 03 | 640 | - | 80 | 280 | 280 | 300 | 3 | 0 | 44 | 34 | 6/7 |
| <i>Mahonia repens</i> | | | | | | | | | | | |
| 85 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 91 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 98 | 40 | - | - | 40 | - | - | 0 | 0 | - | 100 | -/- |
| 03 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | -/- |

| | | Age class distribution (plants per acre) | | | | | Utilization | | | | |
|---------------------------|---------------------------------------|--|-------|--------|----------|------|-------------|---------|------------|--------------|---------------------------|
| Year | Plants per Acre (excluding seedlings) | Seedling | Young | Mature | Decadent | Dead | % moderate | % heavy | % decadent | % poor vigor | Average Height Crown (in) |
| <i>Purshia tridentata</i> | | | | | | | | | | | |
| 85 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 91 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 98 | 0 | - | - | - | - | - | 0 | 0 | - | 0 | -/- |
| 03 | 20 | - | - | 20 | - | - | 0 | 100 | - | 0 | 9/10 |