Trend Study 25B-4-04

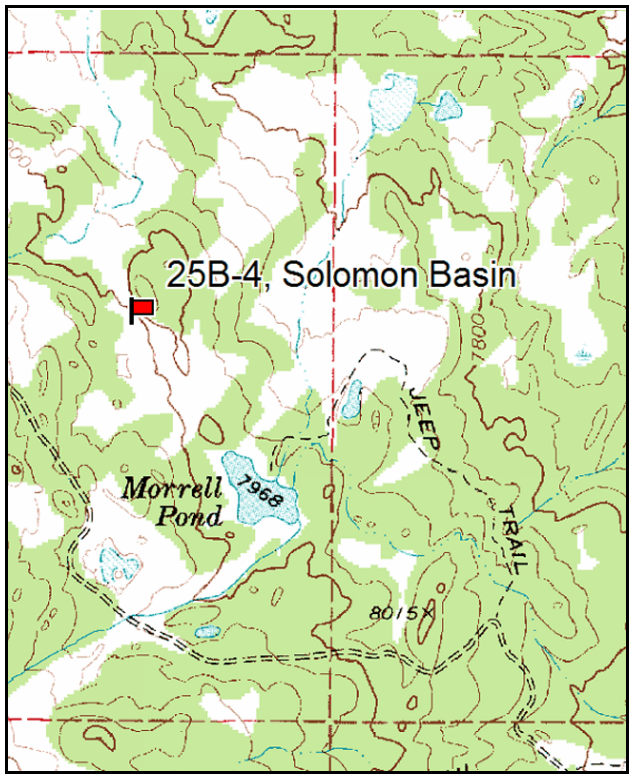
Study site name: Solomon Basin . Vegetation type: Black/Big Sagebrush .

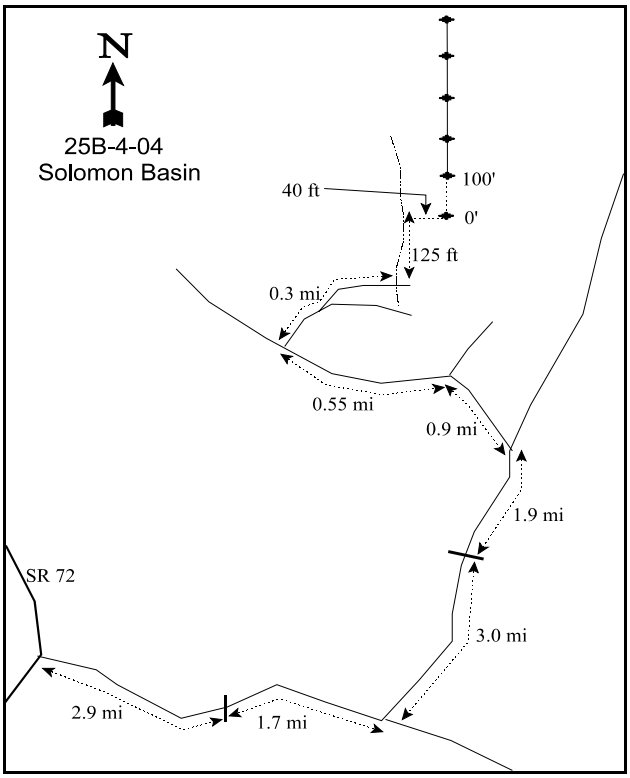
Compass bearing: frequency baseline 320 degrees magnetic.

Frequency belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95 ft).

LOCATION DESCRIPTION

Travel north from Fremont on SR 72 for 7.3 miles to the Elkhorn-Torrey Road. Turn right and go 2.9 miles to a cattleguard. From the cattleguard go 1.7 miles to an intersection by Heart Lake. Turn left toward Meeks Lake and go 3.0 miles to a cattleguard. Go another 1.9 miles on the main road to an intersection. Stay left and go 0.9 miles toward Solomon Basin. Stay left again, bypassing the Morrell Pond Road and continue 0.55 miles, passing a doughnut-shaped pond. Take a sharp right turn here and go 0.2 miles to another fork. Bear left (the right fork takes you to Morrells Pond) and drive less than 0.1 miles to a ditch. Park here (very faint) and walk down the ditch for approximately 125 feet. The 0-foot stake is approximately 40 feet east of the ditch and marked with browse tag #26.





Map Name: Geyser Peak, Utah

Diagrammatic Sketch

Township 26S , Range 4E , Section 14

GPS: NAD 27, UTM 12S 4266794 N, 461715 E

DISCUSSION

Solomon Basin - Trend Study No. 25B-4

This study samples important deer winter range on the gentle rolling terrain of Solomon Basin. The original site had to be relocated in 1994 because of a new road that went through the middle of the original transect. This new site is located between two low parallel ridges, within a moderately shallow and narrow ravine. The elevation is 8,000 feet. Slope varies from 0% to 20%, but on average it is about 5%. Aspect of the site is generally east. The site is dominated by mature pinyon and in the vicinity are stands of aspen and open sagebrush flats. There is a pond nearby, which would tend to concentrate grazing in the area. The area is considered important to both livestock and wildlife. Pellet group data from the site in 1999 estimated 19 deer, 1 elk, and 42 cow days use/acre (47 ddu/ha, 2 edu/ha, and 104 cdu/ha). Data from 2004 estimated 28 deer, 9 elk, and 11 cow days use/acre (69 ddu/ha, 23 edu/ha, and 27 cdu/ha).

The area is also recognized as a key wintering area for deer. Heavy year-long livestock grazing historically has led to deterioration of the range and watershed values until the establishment of a management plan and rest-rotation grazing in 1967. There have been several projects proposed by the Forest Service for the basin, including chaining and seeding pinyon-juniper woodlands and sagebrush treatments. Treatment of the mature pinyon-juniper community is a priority in the DWR management plan in order to provide more herbaceous spring forage and improve protective ground cover.

Excessive livestock trampling, removal of herbaceous vegetation, and rocky soil has led to soil loss. The soil is moderately deep with an effective rooting depth of almost 19 inches with a neutral pH (7.3). The soil texture is a clay loam. Soil phosphorus was low at only 4.6 ppm, where 10 ppm may be limiting for normal plant growth and development. The ratio of bare ground to protective cover (vegetation, litter, and bare ground) has remained stable since 1994 and an erosion condition class rating rated this erosion as stable in 2004.

The dominant overstory is a mixture of mature pinyon pine with a few scattered juniper. The key browse species are mountain big sagebrush and black sagebrush. Together they contribute over 50% of the browse cover. The plants on average have only received light to moderate use. Black sagebrush density and cover has slowly increased since 1994, while decadence has decreased. Mountain big sagebrush density has decreased slightly with each reading since 1994, but decadency has been low and vigor good. Some plants exhibit characteristics of basin big sagebrush. The browse species that appear to be more preferred are coryombed eriogonum, Utah serviceberry, and winterfat. Coryombed eriogonum density decreased about 20% in both 1999 and 2004. Nearly 50% of the plants showed signs of heavy use in 2004. Broom snakeweed density was stable between 1994 and 1999, but dropped by about half in 2004. Pinyon cover has increased with each reading to 10% in 2004. Point quarter data estimated 82 pinyon trees/acre in 1999 and increased to 97 trees/acre in 2004. Average diameter was 2.1 inches in 1999 and 1.9 inches in 2004. A few junipers were also found on the site.

Even though there are about 10 species of grasses on the site, three species (blue grama, Salina wildrye, and Kentucky bluegrass) are found in the greatest abundance. Kentucky bluegrass is a valuable species because it is sod forming and somewhat resistant to grazing, however it is an increaser with moderate to heavy grazing pressure. Along with the other grass species, they provide a small amount of fall forage. Salina wildrye and Kentucky bluegrass decreased significantly in 2004. Total grass cover was about 50% lower in 2004. Forbs are not very abundant. Dandelion and Pingue hymenoxys are the most common species.

1994 APPARENT TREND ASSESSMENT

The original study site had to be relocated because the road was moved and put through the middle of the

baseline. Therefore, the data collected for the first site (1985 and 1991) are not included here so that there will be no confusion by trying to unknowingly compare the two sites. Soil trend would be considered stable at this time, but only in fair condition with 31% bare ground and only 30% litter cover. The two most abundant key browse species on the site are black sagebrush and mountain big sagebrush. The basic trend for the original site since 1985 is that black sagebrush are slowly increasing while mountain big sagebrush was decreasing. The loss of mountain big sagebrush would be more significant because they are about three times taller than black sagebrush, making them more available for winter use. Trend for browse on the relocated site appears stable. They are both about equal in the amount of cover each contributes to the total browse cover. The trend for the herbaceous understory also appears stable without any previous data.

winter range condition (DC Index) - 56 (fair) Mountain big sagebrush

1999 TREND ASSESSMENT

Trend for soil is stable at this time, with little changes in percent bare soil and litter cover. The ratio of protective cover to bare soil is slightly better, but still considered poor at less than 2:1. The two most abundant browse species on the site are black sagebrush and mountain big sagebrush. The basic trend for the new site is that black sagebrush appears to be slowly increasing, while mountain big sagebrush is slowly decreasing. The mountain big sagebrush would be more effected by drought than black sagebrush. The loss of mountain big sagebrush would be more significant in that they are about three times taller than black sagebrush, making them more available for winter use with moderately deep snow. Trend for browse would still be stable with some losses to mountain big sagebrush, but gains to black sagebrush. They are both about equal in the amount of cover each contributes to the total browse cover. As indicated by the lower sum of nested frequency values, the trend for the herbaceous understory is down for both grasses and forbs. The Desirable Components Index (see methods) rating is good at 72. Palatable browse and herbaceous cover has increased.

TREND ASSESSMENT
soil - stable, but only fair condition (3)
browse - stable overall (3)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 72 (good) Mountain big sagebrush

2004 TREND ASSESSMENT

The trend for soil is stable. The ratio of are ground to protective cover has not changed. The browse trend is slightly down as the more palatable and taller mountain big sagebrush density and cover has decreased slightly. Black sagebrush density and cover has increased slightly, but is less preferred by wildlife. Coryombed eriogonum density decreased also. Pinyon density and cover is increasing. The herbaceous understory trend is slightly down as drought conditions have affected many areas around the state. Perennial grass and forb frequency and nested frequency has decreased substantially, by about 20%.

TREND ASSESSMENT
soil - stable, but only fair condition (3)
browse - slightly down (2)
herbaceous understory - slightly down (2)
winter range condition (DC Index) - 57 (fair) Mountain big sagebrush

HERBACEOUS TRENDS --
Management unit 25B, Study no: 4

Type	Species	Nested Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
G	Agropyron smithii	-	1	11	-	.00	.36
G	Agropyron spicatum	-	4	-	-	.03	-
G	Bouteloua gracilis	56	35	23	.78	1.45	.53
G	Carex spp.	23	16	18	.16	.12	.31
G	Elymus salina	$_{b}$201	$_{b}$168	$_{a}$135	5.25	4.33	3.33
G	Festuca ovina	10	3	-	.18	.03	-
G	Oryzopsis hymenoides	16	3	21	.09	.15	.07
G	Poa fendleriana	-	6	4	-	.06	.18
G	Poa pratensis	$_{b}$65	$_{b}$76	$_{a}$25	2.55	5.40	.60
G	Poa secunda	7	-	3	.01	-	.03
G	Sitanion hystrix	11	12	18	.05	.12	.11
G	Stipa columbiana	4	-	-	.03	-	-
G	Stipa comata	6	-	2	.03	-	.18
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		399	324	260	9.16	11.73	5.73
Total for Grasses		399	324	260	9.16	11.73	5.73
F	Achillea millefolium	-	-	4	-	-	.09
F	Antennaria rosea	5	5	5	.15	.38	.15
F	Androsace septentrionalis (a)	-	2	-	-	.00	-
F	Arabis demissa	-	5	-	-	.01	-
F	Artemisia ludoviciana	3	4	3	.03	.15	.00
F	Astragalus convallarius	6	6	1	.01	.04	.03
F	Astragalus miser	-	1	2	-	.00	.00
F	Aster spp.	$_{a}$5	$_{ab}$18	$_{b}$39	.01	.36	.76
F	Astragalus spp.	$_{b}$11	$_{a}$1	$_{a}$3	.02	.00	.01
F	Castilleja linariaefolia	7	3	8	.02	.03	.10
F	Cirsium spp.	9	9	9	.07	.22	.18
F	Cryptantha spp.	11	3	3	.05	.04	.03
F	Cymopterus spp.	-	-	4	-	-	.03
F	Erigeron pumilus	$_{b}$18	$_{a}$4	$_{a}$-	.03	.01	-
F	Eriogonum racemosum	-	-	-	-	.00	-
F	Hymenoxys richardsonii	$_{b}$57	$_{b}$38	$_{a}$8	.62	.69	.05
F	Lesquerella spp.	3	-	-	.00	-	-
F	Machaeranthera canescens	$_{b}$36	$_{a}$11	$_{a}$10	.38	.49	.26
F	Microsteris gracilis (a)	3	-	-	.00	-	.00

Type	Species	Nested Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
F	Penstemon comarrhenus	-	-	1	-	-	.00
F	Penstemon spp.	2	4	8	.00	.04	.03
F	Phlox longifolia	11	9	9	.02	.01	.05
F	Schoencrambe linifolia	7	-	-	.04	-	-
F	Senecio multilobatus	-	3	2	-	.00	.00
F	Sphaeralcea coccinea	4	2	9	.01	.03	.06
F	Taraxacum officinale	$_{a}$18	$_{b}$52	$_{a}$3	.49	1.85	.03
F	Tragopogon dubius	-	-	4	-	-	.00
F	Unknown forb-perennial	-	1	-	-	.00	-
Total for Annual Forbs		3	2	0	0.00	0.00	0.00
Total for Perennial Forbs		213	179	135	2.00	4.40	1.92
Total for Forbs		216	181	135	2.00	4.41	1.92

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

BROWSE TRENDS --
Management unit 25B, Study no: 4

Type	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Amelanchier utahensis	9	5	8	.63	.03	-
B	Artemisia frigida	1	1	0	-	-	-
B	Artemisia nova	39	57	55	4.28	6.84	7.03
B	Artemisia tridentata vaseyana	24	32	32	3.94	6.73	6.41
B	Ceratoides lanata	9	10	7	.21	.33	.19
B	Chrysothamnus nauseosus	17	18	14	2.23	3.11	2.32
B	Chrysothamnus viscidiflorus viscidiflorus	50	42	47	2.21	1.47	4.39
B	Coryphantha vivipara arizonica	0	1	0	-	.00	-
B	Eriogonum corymbosum	22	21	23	.88	1.17	1.48
B	Gutierrezia sarothrae	53	49	39	1.27	1.00	1.52
B	Juniperus osteosperma	0	1	1	.15	.15	.03
B	Opuntia spp.	2	2	1	.01	-	-
B	Pediocactus simpsonii	0	2	1	-	.03	.00
B	Pinus edulis	0	13	12	3.49	4.09	6.13
B	Symphoricarpos oreophilus	5	8	9	.16	.48	.74
B	Tetradymia canescens	14	17	15	.10	.24	.93
B	Yucca harrimaniae	0	2	3	-	.18	-
Total for Browse		245	281	267	19.60	25.92	31.19

CANOPY COVER, LINE INTERCEPT --
Management unit 25B, Study no: 4

Species	Percent Cover	
	'99	'04
Amelanchier utahensis	1.60	.93
Artemisia nova	-	9.69
Artemisia tridentata vaseyana	-	8.16
Ceratoides lanata	-	.50
Chrysothamnus nauseosus	-	4.66
Chrysothamnus viscidiflorus viscidiflorus	-	5.30
Eriogonum corymbosum	-	1.98
Gutierrezia sarothrae	-	.58
Pinus edulis	8.39	9.25
Symphoricarpos oreophilus	-	1.76
Tetradymia canescens	-	1.06
Yucca harrimaniae	-	.50

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 25B, Study no: 4

Species	Average leader growth (in)
	'04
Amelanchier utahensis	5.2
Artemisia tridentata vaseyana	1.4

POINT-QUARTER TREE DATA --
Management unit 25B, Study no: 4

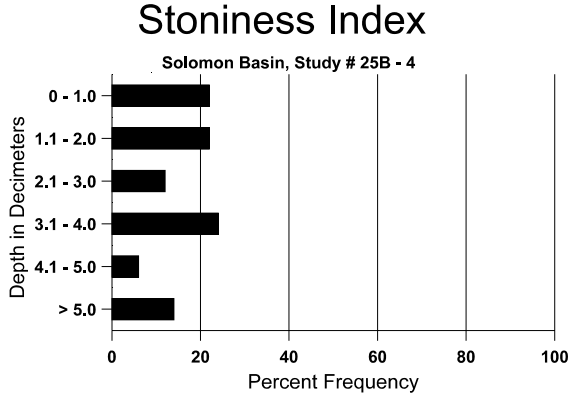
Species	Trees per Acre		Average diameter (in)	
	'99	'04	'99	'04
Juniperus osteosperma	27	24	2.9	3.2
Pinus edulis	82	97	2.1	1.9

BASIC COVER --
Management unit 25B, Study no: 4

Cover Type	Average Cover %		
	'94	'99	'04
Vegetation	27.32	38.12	37.22
Rock	5.05	2.79	4.19
Pavement	4.77	10.95	16.01
Litter	29.63	31.77	30.99
Cryptogams	.30	.43	.68
Bare Ground	31.40	29.84	28.35

SOIL ANALYSIS DATA --
Management unit 25B, Study no: 4, Study Name: Solomon Basin

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	ds/m
18.7	51.7 (16.7)	7.3	44.2	20.2	35.6	2.0	4.6	208.0	0.5



PELLET GROUP DATA --
Management unit 25B, Study no: 4

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	5	12	6
Elk	-	1	-
Deer	11	6	11
Cattle	1	9	3
Mosse	-	-	-

Days use per acre (ha)	
'99	'04
-	-
1 (2)	9 (23)
19 (47)	28 (69)
42 (104)	11 (27)
-	1 (2)

BROWSE CHARACTERISTICS --
Management unit 25B, 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 utahensis												
94	**280**	-	20	260	-	-	7	7	0	-	0	33/42
99	**120**	40	20	40	60	-	33	0	50	17	33	50/57
04	**200**	-	60	120	20	-	20	60	10	10	10	57/55
Artemisia frigida												
94	**40**	-	-	40	-	-	0	0	-	-	0	1/2
99	**20**	-	-	20	-	-	0	0	-	-	0	2/6
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Artemisia nova												
94	**4140**	40	140	3100	900	60	5	.48	22	6	6	10/16
99	**4680**	180	900	3080	700	240	22	3	15	.42	.42	8/17
04	**4880**	200	720	3620	540	280	0	0	11	7	8	9/19
Artemisia tridentata vaseyana												
94	**1500**	-	540	860	100	140	1	0	7	4	4	19/28
99	**1360**	-	100	1080	180	-	18	3	13	3	3	23/36
04	**1000**	380	140	760	100	80	18	2	10	4	4	24/40
Atriplex canescens												
94	**0**	-	-	-	-	-	0	0	-	-	0	28/23
99	**0**	-	-	-	-	-	0	0	-	-	0	37/32
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Ceratoides lanata												
94	**380**	-	-	380	-	-	58	26	0	-	0	6/6
99	**460**	40	60	360	40	-	22	74	9	-	0	4/7
04	**380**	-	-	340	40	-	5	89	11	5	5	7/8
Cercocarpus montanus												
94	**0**	-	-	-	-	-	0	0	-	-	0	15/24
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Chrysothamnus depressus												
94	**0**	-	-	-	-	-	0	0	-	-	0	6/12
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**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	% dying	% poor vigor	Average Height Crown (in)
Chrysothamnus nauseosus												
94	**640**	20	40	580	20	-	0	3	3	-	0	27/29
99	**820**	-	120	580	120	20	0	0	15	5	7	34/39
04	**460**	-	20	360	80	20	0	0	17	13	13	32/34
Chrysothamnus viscidiflorus viscidiflorus												
94	**2720**	-	200	2200	320	20	3	2	12	5	5	9/16
99	**2020**	20	320	1340	360	20	0	0	18	6	6	12/16
04	**2240**	40	340	1700	200	40	4	0	9	4	10	12/16
Coryphantha vivipara arizonica												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	-	20	-	-	0	100	-	-	0	1/4
04	**0**	-	-	-	-	-	0	0	-	-	0	2/3
Eriogonum corymbosum												
94	**2660**	40	340	2320	-	-	40	24	0	-	0	4/8
99	**2100**	-	460	1380	260	-	20	11	12	2	2	9/16
04	**1620**	-	320	1280	20	80	19	48	1	-	0	9/16
Gutierrezia sarothrae												
94	**4280**	40	460	3740	80	100	0	0	2	-	0	6/5
99	**4020**	100	420	3600	-	100	0	.49	0	-	0	7/7
04	**2060**	-	200	1860	-	-	0	0	0	-	0	8/8
Juniperus osteosperma												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**20**	-	20	-	-	-	0	0	-	-	0	-/-
04	**20**	-	20	-	-	-	0	0	-	-	0	-/-
Opuntia spp.												
94	**40**	-	-	40	-	-	0	0	-	-	0	1/2
99	**40**	-	-	40	-	-	0	0	-	-	0	-/-
04	**20**	-	-	20	-	-	0	0	-	-	0	4/15
Pediocactus simpsonii												
94	**0**	-	-	-	-	-	0	0	-	-	0	2/3
99	**40**	-	-	40	-	-	0	0	-	-	0	2/3
04	**20**	-	-	20	-	-	0	0	-	-	0	1/2
Pinus edulis												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**280**	140	260	20	-	40	0	0	-	-	0	-/-
04	**280**	80	160	120	-	20	0	0	-	-	0	-/-

		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)
Ribes spp.												
94	**0**	-	-	-	-	-	0	0	-	-	0	26/35
99	**0**	-	-	-	-	-	0	0	-	-	0	-/-
04	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Symphoricarpos oreophilus												
94	**120**	-	-	120	-	-	0	17	0	-	0	15/23
99	**280**	40	60	200	20	-	7	0	7	7	7	16/28
04	**300**	-	120	160	20	-	0	0	7	-	7	16/25
Tetradymia canescens												
94	**520**	-	60	440	20	-	0	0	4	4	8	10/17
99	**580**	40	120	340	120	-	14	3	21	7	7	10/15
04	**660**	-	260	360	40	-	6	0	6	-	0	11/18
Yucca harrimaniae												
94	**0**	-	-	-	-	-	0	0	-	-	0	-/-
99	**180**	-	-	180	-	60	0	0	-	-	0	13/16
04	**240**	-	40	200	-	-	0	0	-	-	0	7/12