Trend Study 4-1-06

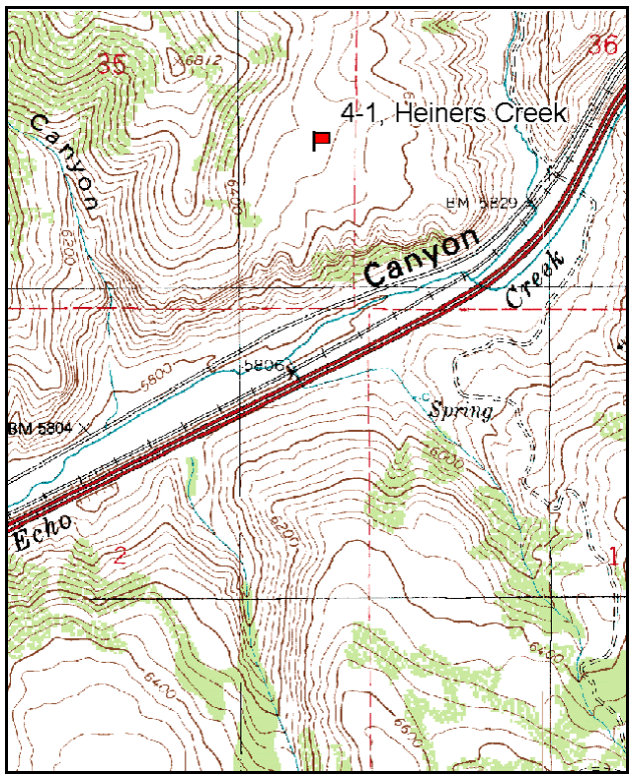
Study site name: Heiner's Creek . Vegetation type: Mountain Brush .

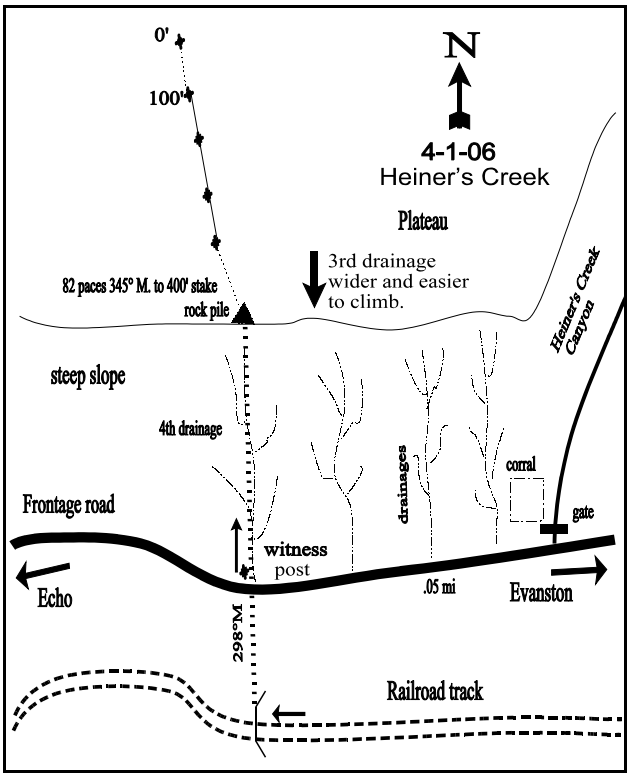
Compass bearing: frequency baseline 164 degrees magnetic

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

LOCATION DESCRIPTION

From exit 169 on I-80, travel 6.2 miles northeast on the frontage road to a witness post on the north side of the road next to a large rock. Hike up the third drainage west of Heiner's Creek. This drainage is wider and easier to hike up. Once on the top of the bench walk west to the head of the next drainage to the west. The 400-foot stake is located at the head of this gully. The 0-foot baseline stake is 400 feet to the north at a bearing of 326 degrees magnetic. Browse tag #7941.





Map Name: Heiner's Creek

Diagrammatic Sketch

Township 4N , Range 5E , Section 35

UTM NAD 27, UTM 12T 4542443 N 471242 E

DISCUSSION

Heiner's Creek - Trend Study No. 4-1

Study Information

This study samples critical deer winter range on the north side of Echo Canyon, just west of Heiner's Creek (elevation: 6,300 feet, slope: 10%, aspect: southeast). It is located above the steep bluffs, or cliffs, prevalent in Echo Canyon. The range type is mixed mountain brush, which appears to have been burned prior to the 1984 reading. After the fire, the dominant community changed from increaser species to mountain big sagebrush. The area is considered important winter range for deer and, to a lesser extent, elk. It is also used by cattle during the summer and had been heavily utilized by cattle prior to the 1996 reading. Pellet group data in 2001 estimated 2 elk, 41 deer, and 5 cow days use/acre (5 edu/ha, 101 ddu/ha, and 13 cdu/acre). Pellet group data from 2006 estimated 16 elk, 46 deer, and 6 cow days use/acre (40 edu/ha, 112 ddu/ha, and 14 cdu/ha). Most of the deer pellet groups appear to be from winter or early spring use.

Soil

The soil is in the Fewkes series which consists of very deep, well drained soils that formed in slope alluvium, residuum, and colluvium derived from quarzite, sandstone, and shale (USDA-NRCS 2006). It has a clay loam texture with a neutral soil reaction (pH of 6.6). A compacted clay horizon was estimated at 10 inches below the surface. There are abundant signs of soil movement, including soil pedestalling around shrubs, rills, and an active gully near the end of the base line. However, much of the exposed bare ground is not connected due to the moderately abundant herbaceous cover. The relative bare ground cover was 19% in 1996 and 22% in 2001 and 2006. The soil erosion condition class was determined to be moderate in 2001 and 2006.

Browse

The key browse species is mountain big sagebrush with scattered antelope bitterbrush and serviceberry. Mountain big sagebrush density was about 300 plants/acre in both 1984 and 1990, all of which were remnants of the fire. Most of these shrubs were classified as mature. Due to the larger sample size used in 1996, accuracy for estimating shrub densities with clumped or discontinuous distributions was greatly improved. As a result of these changes in methods and some recovery from the fire, the estimated density of sagebrush increased to 1,060 plants/acre in 1996. Nearly 80% were classified as mature plants and only 2% were classified as decadent. Seedlings and young were abundant. The shrub density increased to 4,120 plants/acre by 2001 (a 74% increase); young plants provided 2,740 plants/acre (67% of the population). In 2006, the sagebrush density increased again to 4,360 plants/acre, 50% of which were classified as mature. Because of the high recruitment, many of the mature individuals were relatively small and had recently begun flowering. Use has continued to be light, vigor normal, and decadence low.

Bitterbrush individuals are scarce with only 33 plants/acre estimated in 1990, 100 plants/acre in 1996 and 2001, and 40 plants/acre in 2006. These shrubs were very heavily utilized in 1990. During the 1996 reading no bitterbrush were producing seed and 40% were heavily hedged. Due to the heavy use and dry conditions in the late 1980's and early 1990's, 20% displayed poor vigor. Use of bitterbrush was moderate to heavy and no seeds were identified in 2001, but vigor improved. Use in 2006 was heavy. Serviceberry also occurs in limited numbers and had an estimated density of 80 plants/acre in 1996, 320 plants/acre in 2001, then 100 plants/acre in 2006. Most plants have showed light use, but utilization was heavy in 2006.

The most abundant shrubs are increaser species, Woods rose and stickyleaf low rabbitbrush. These shrubs provided the bulk of browse forage. Stickyleaf low rabbitbrush cover has decreased steadily from 22% in 1996, to 20% in 2001, to 14% in 2006. The rabbitbrush population density was about 14,500 plants/acre in 1996 and 2001, and 13,180 plants/acre in 2006 . The population displayed a 61% increase from 1990 to 1996, partly due to the increased sample size. Woods rose is also abundant, but has only provided about 2% cover. The population density has ranged from 8,565 plants/acre in 1990 to 3,780 plants/acre in 1996. The bulk of the population has consistently been within the young age class.

Herbaceous Understory

The herbaceous understory vegetation is patchy and includes several low-growing weedy species. Grasses are diverse and abundant and provided 12% cover in 1996, 20% in 2001, and 17% in 2006. Common grasses include bluebunch wheatgrass, Sandberg bluegrass, mutton bluegrass, and Kentucky bluegrass. Forb diversity was low in 1984 (after the fire) with 12 sampled species, but has steadily increased to 27 species in 2006. The most abundant perennial forbs have been western yarrow, pacific aster, thistle, and longleaf phlox. Bur buttercup was the most abundant annual forb in 2001 and 2006.

1990 TREND ASSESSMENT

Mountain big sagebrush has remained at a similar density to that of 1984. The mature sagebrush are vigorous and moderately to heavily hedged. Sagebrush canopy cover averages 3%. No seedling or young sagebrush were sampled. The few bitterbrush sampled were all heavily hedged. The increaser species, stickyleaf low rabbitbrush, has declined slightly in density. Trend for browse is stable. The grass trend is up. The sum of the nested frequency of perennial grasses increased 35%. The nested frequency of Sandberg bluegrass and mutton bluegrass increased significantly, but the nested frequency of bottlebrush squirreltail, bluebunch wheatgrass, and thickspike wheatgrass all decreased significantly. The forb trend is down. The nested frequency of perennial forbs decreased by 33%. The site is still recovering from the fire.

browse - stable (0) grass - up (+2) forb - down (-2)

1996 TREND ASSESSMENT

Trend for browse is slightly up. Density has increased 72% since 1990, but this is partially due to the larger sample size used in 1996. Nonetheless, the sagebrush population increased substantially. Age class analysis indicates a slightly increasing population. Utilization is mostly light, vigor normal, and decadence low at only 2%. The other preferred browse, antelope bitterbrush and serviceberry, occur in small numbers and have received continued heavy use. The increaser, stickyleaf low rabbitbrush, still dominates by providing the majority of the browse cover. As with the sagebrush, much of the rabbitbrush density increase is due to the increase in sample size. The grass trend is slightly up. The nested frequency of perennial grasses increased 33%. This increase is due mainly to significantly increases in the nested frequencies of bluebunch wheatgrass, thickspike wheatgrass, and Kentucky bluegrass. Some of the increase is a product of the increased sample area. The forb trend is stable. The nested frequency of perennial forbs remained similar to that of 1990. The Desirable Components Index score is good due to moderate browse cover, low decadence, and high perennial grass cover.

winter range condition (DC Index) - good (63) Mid-level potential scale
browse - slightly up (+1) grass - slightly up (+1) forb - stable (0)

2001 TREND ASSESSMENT

The trend for browse is up. Density has increased 74% from 1,060 plants/acre in 1996 to 4,120 plants/acre in 2001. In addition, young plants currently account for 67% of the population and seedlings are also numerous. This indicates an expanding population. Serviceberry and bitterbrush still occur in limited numbers but they do provide some additional browse forage. Serviceberry has increased in density while bitterbrush has remained stable. The increaser, stickyleaf low rabbitbrush is still the most abundant species with a stable population of 14,840 plants/acre. The grass trend is slightly down. The nested frequency of perennial grasses decreased 18%. Much of this loss was in the nested frequency of bluebunch wheatgrass, thickspike wheatgrass, and mutton bluegrass. However, cheatgrass nested frequency decreased significantly. The forb trend is slightly up. The nested frequency of perennial forbs increased by 44%, but some of the increases were in species which are less desirable for big game. The undesirable bur buttercup increased significantly in nested frequency. The Desirable Components Index score improved to excellent due to increases in browse cover, young individuals, and perennial grass and forb cover.

winter range condition (DC Index) - excellent (84) Mid-level potential scale
browse - up (+2) grass - slightly down (-1) forb - slightly up (+1)

2006 TREND ASSESSMENT

The trend for browse is stable. The mountain big sagebrush density remained unchanged, but shifted from a predominantly young population to one more mature. Fifty percent of the population was classified as mature, as opposed to 31% in 2001. Bitterbrush and serviceberry densities continued to be low. The grass trend is slightly up. The nested frequency of perennial forbs increased 15% and cheatgrass nested frequency remained unchanged. The forb trend is stable. The nested frequency and composition of perennial forbs remained similar. The Desirable Components Index score remained excellent.

winter range condition (DC Index) - excellent (95) Mid-level potential scale
browse - stable (0) grass - slightly up (+1) forb - stable (0)

HERBACEOUS TRENDS --
Management unit 04 , Study no: 1

Type	Species	Nested Frequency					Average Cover %		
		'84	'90	'96	'01	'06	'96	'01	'06
G	Agropyron dasystachyum	$_{b}$41	$_{a}$2	$_{cd}$92	$_{bc}$68	$_{d}$98	.55	.71	1.28
G	Agropyron spicatum	$_{c}$169	$_{a}$69	$_{c}$130	$_{ab}$80	$_{bc}$108	2.67	3.33	2.97
G	Bromus tectorum (a)	-	-	$_{b}$140	$_{a}$61	$_{a}$69	1.60	.80	.26
G	Carex sp.	-	-	3	-	10	.03	-	.09
G	Elymus cinereus	3	1	9	6	8	.21	.18	.36
G	Koeleria cristata	1	3	3	9	7	.03	.10	.07
G	Melica bulbosa	-	-	3	-	-	.01	-	-
G	Poa fendleriana	$_{a}$14	$_{c}$152	$_{b}$88	$_{a}$19	$_{a}$38	1.73	.98	1.10
G	Poa pratensis	$_{a}$6	$_{a}$7	$_{b}$42	$_{b}$64	$_{b}$62	1.00	4.11	1.98
G	Poa secunda	$_{a}$82	$_{b}$208	$_{b}$209	$_{b}$249	$_{b}$229	5.17	10.55	8.90
G	Sitanion hystrix	$_{b}$14	$_{a}$3	$_{a}$1	$_{a}$1	$_{a}$-	.00	.00	-
G	Stipa comata	9	12	-	-	-	-	-	-
G	Stipa lettermani	$_{a}$-	$_{a}$-	$_{b}$30	$_{a}$6	$_{ab}$17	.66	.41	.22
Total for Annual Grasses		0	0	140	61	69	1.60	0.80	0.26
Total for Perennial Grasses		339	457	610	502	577	12.09	20.38	17.01
Total for Grasses		339	457	750	563	646	13.69	21.19	17.28
F	Achillea millefolium	$_{c}$137	$_{a}$40	$_{b}$71	$_{ab}$61	$_{a}$31	.80	.96	.59
F	Agoseris glauca	-	-	-	-	1	-	-	.00
F	Allium acuminatum	$_{bc}$54	$_{a}$-	$_{a}$2	$_{b}$32	$_{c}$63	.01	.18	.22
F	Antennaria rosea	4	2	1	5	-	.00	.03	-
F	Arabis sp.	$_{a}$5	$_{a}$2	$_{a}$4	$_{b}$45	$_{a}$14	.03	.18	.02
F	Artemisia ludoviciana	3	4	-	-	-	-	-	-
F	Aster chilensis	$_{a}$87	$_{a}$67	$_{ab}$100	$_{b}$128	$_{a}$91	1.87	2.64	3.00

Type	Species	Nested Frequency					Average Cover %		
		'84	'90	'96	'01	'06	'96	'01	'06
F	Astragalus convallarius	$_{a}$12	$_{a}$7	$_{a}$4	$_{a}$11	$_{b}$31	.01	.22	.41
F	Astragalus lentiginosus	-	2	-	6	8	-	.09	.30
F	Calochortus nuttallii	-	-	-	-	2	-	-	.00
F	Cirsium sp.	$_{ab}$13	$_{b}$31	$_{ab}$18	$_{a}$3	$_{a}$1	.52	.09	.01
F	Collomia linearis (a)	-	-	$_{a}$-	$_{b}$10	$_{ab}$6	-	.02	.01
F	Comandra pallida	$_{b}$68	$_{b}$51	$_{a}$4	$_{a}$18	$_{a}$4	.01	.09	.09
F	Collinsia parviflora (a)	-	-	$_{a}$5	$_{b}$118	$_{b}$123	.01	.46	.30
F	Draba sp. (a)	-	-	$_{a}$-	$_{b}$11	$_{c}$32	-	.19	.06
F	Epilobium brachycarpum (a)	-	-	$_{a}$-	$_{a}$-	$_{b}$163	-	-	.47
F	Eriogonum umbellatum	$_{b}$19	$_{ab}$14	$_{ab}$10	$_{a}$5	$_{a}$7	.23	.09	.24
F	Hackelia patens	-	-	7	-	4	.06	-	.06
F	Helianthella uniflora	$_{b}$28	$_{b}$32	$_{a}$-	$_{a}$-	$_{a}$2	-	-	.03
F	Heterotheca villosa	-	-	3	-	-	.00	-	-
F	Lappula occidentalis (a)	-	-	-	4	-	-	.03	-
F	Lithospermum ruderale	-	-	1	1	1	.03	.15	.03
F	Lupinus argenteus	$_{a}$3	$_{a}$3	$_{ab}$11	$_{b}$39	$_{c}$49	.10	.78	1.12
F	Machaeranthera canescens	-	-	5	-	-	.01	-	-
F	Microsteris gracilis (a)	-	-	$_{a}$-	$_{b}$16	$_{c}$134	-	.03	.39
F	Phlox longifolia	$_{a}$-	$_{b}$33	$_{bc}$52	$_{bc}$65	$_{c}$75	.14	.32	.30
F	Polygonum douglasii (a)	-	-	$_{c}$39	$_{a}$-	$_{b}$6	.12	-	.02
F	Ranunculus testiculatus (a)	-	-	$_{a}$105	$_{b}$194	$_{b}$220	.37	1.91	2.17
F	Senecio integerrimus	-	-	-	-	7	-	-	.09
F	Sphaeralcea coccinea	-	-	-	-	1	-	.03	.15
F	Taraxacum officinale	-	-	-	1	5	-	.00	.03
F	Tragopogon dubius	-	-	-	3	7	-	.00	.07
Total for Annual Forbs		0	0	149	353	684	0.50	2.67	3.45
Total for Perennial Forbs		433	288	293	423	404	3.88	5.88	6.80
Total for Forbs		433	288	442	776	1088	4.39	8.55	10.26

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

BROWSE TRENDS --
Management unit 04 , Study no: 1

Type	Species	Strip Frequency			Average Cover %		
		'96	'01	'06	'96	'01	'06
B	Amelanchier alnifolia	4	7	4	.41	.71	1.03
B	Artemisia tridentata vaseyana	34	62	69	4.92	8.73	17.01
B	Chrysothamnus nauseosus albicaulis	1	1	0	.38	.38	-
B	Chrysothamnus viscidiflorus viscidiflorus	99	100	94	22.09	19.86	14.38
B	Purshia tridentata	5	4	2	.00	.00	.03
B	Rosa woodsii	29	30	31	1.77	1.62	2.40
B	Symphoricarpos oreophilus	8	8	8	.67	.53	.18
B	Tetradymia canescens	0	0	1	-	-	.03
Total for Browse		180	212	209	30.26	31.85	35.08

CANOPY COVER, LINE INTERCEPT --
Management unit 04 , Study no: 1

Species	Percent Cover '06
Amelanchier alnifolia	.43
Artemisia tridentata vaseyana	17.10
Chrysothamnus viscidiflorus viscidiflorus	17.95
Purshia tridentata	.18
Rosa woodsii	2.13
Symphoricarpos oreophilus	1.01

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 04 , Study no: 1

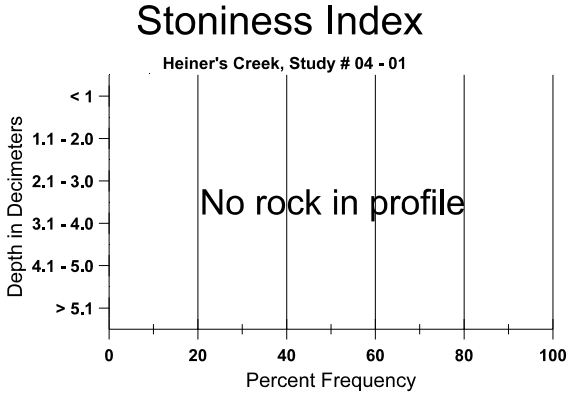
Species	Average leader growth (in)	
	'01	'06
Amelanchier alnifolia	3.5	4.2
Artemisia tridentata vaseyana	3.3	2.1
Purshia tridentata	1.8	2.5

BASIC COVER --
Management unit 04 , Study no: 1

Cover Type	Average Cover %				
	'84	'90	'96	'01	'06
Vegetation	6.75	10.25	48.59	55.00	51.95
Rock	0	0	.14	.64	.10
Pavement	3.00	1.25	.72	.59	1.17
Litter	58.75	51.75	45.24	38.59	35.07
Cryptogams	.75	.75	.34	.31	1.85
Bare Ground	30.75	36.00	22.39	26.87	25.97

SOIL ANALYSIS DATA --
Herd Unit 04, Study no: 01, Heiner's Creek

Effective rooting depth (in)	Temp °F (depth)	PH	Clay loam			%0M	PPM P	PPM K	dS/m
			%sand	%silt	%clay				
10.1	66.2 (14.1)	6.6	31.9	32.1	36.0	3.2	19.9	144.0	0.4



PELLET GROUP DATA --
Management unit 04 , Study no: 1

Type	Quadrat Frequency		
	'96	'01	'06
Rabbit	-	2	56
Horse	3	-	-
Elk	-	2	23
Deer	15	17	32
Cattle	1	2	4

Days use per acre (ha)	
'01	'06
-	-
-	-
1 (3)	16 (40)
41 (101)	46 (112)
5 (13)	6 (14)

BROWSE CHARACTERISTICS --
Management unit 04 , 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)
Amelanchier alnifolia												
84	**0**	-	-	-	-	-	0	0	-	-	0	-/-
90	**33**	-	-	33	-	-	0	0	-	-	0	14/20
96	**80**	-	20	60	-	-	0	25	-	-	0	18/30
01	**320**	-	140	180	-	-	31	6	-	-	0	20/27
06	**100**	-	40	60	-	-	40	60	-	-	0	28/39
Artemisia tridentata vaseyana												
84	**333**	-	133	200	-	-	0	0	0	-	0	19/17
90	**299**	-	-	266	33	-	22	33	11	-	0	24/23
96	**1060**	180	200	840	20	20	23	0	2	2	2	26/35
01	**4120**	1000	2740	1260	120	60	4	0	3	2	5	29/39
06	**4360**	760	1840	2180	340	80	15	2	8	3	4	25/38
Chrysothamnus nauseosus albicaulis												
84	**33**	-	-	33	-	-	0	0	0	-	0	20/31
90	**33**	-	-	-	33	-	0	0	100	-	0	-/-
96	**20**	-	-	-	20	-	0	0	100	-	0	25/35
01	**20**	-	-	20	-	-	0	0	0	-	0	18/24
06	**0**	-	-	-	-	-	0	0	0	-	0	-/-
Chrysothamnus viscidiflorus viscidiflorus												
84	**6899**	66	1033	5300	566	-	0	0	8	-	0	15/24
90	**5566**	-	1100	3500	966	-	7	0	17	-	0	11/15
96	**14240**	160	2060	11760	420	20	3	0	3	-	.28	14/23
01	**14840**	120	1240	13060	540	160	1	0	4	.13	.67	11/19
06	**13180**	120	1780	10580	820	100	5	0	6	2	2	10/18
Purshia tridentata												
84	**66**	-	-	66	-	-	100	0	-	-	0	8/21
90	**33**	-	-	33	-	-	0	100	-	-	0	13/39
96	**100**	-	40	60	-	-	20	40	-	-	20	14/41
01	**100**	-	20	80	-	-	20	60	-	-	0	13/38
06	**40**	-	-	40	-	-	0	100	-	-	0	15/52

		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)
Rosa woodsii												
84	**7499**	766	7333	166	-	-	0	0	0	-	0	14/11
90	**8565**	-	8066	233	266	-	0	0	3	-	0	12/8
96	**3780**	500	1180	2600	-	-	0	0	0	-	0	14/16
01	**5960**	-	5620	340	-	20	55	0	0	-	0	15/9
06	**6980**	420	5120	1840	20	-	.57	0	0	.28	.57	9/8
Symphoricarpos oreophilus												
84	**399**	-	33	366	-	-	50	8	-	-	0	14/29
90	**200**	-	-	200	-	-	17	33	-	-	0	17/27
96	**200**	-	20	180	-	-	30	0	-	-	0	17/36
01	**240**	-	-	240	-	-	42	0	-	-	0	14/29
06	**220**	-	20	200	-	-	0	0	-	-	0	16/31
Tetradymia canescens												
84	**0**	-	-	-	-	-	0	0	0	-	0	-/-
90	**0**	-	-	-	-	-	0	0	0	-	0	-/-
96	**0**	-	-	-	-	-	0	0	0	-	0	-/-
01	**0**	-	-	-	-	-	0	0	0	-	0	-/-
06	**20**	-	-	-	20	-	0	0	100	-	0	-/-