Trend Study 2-15-06

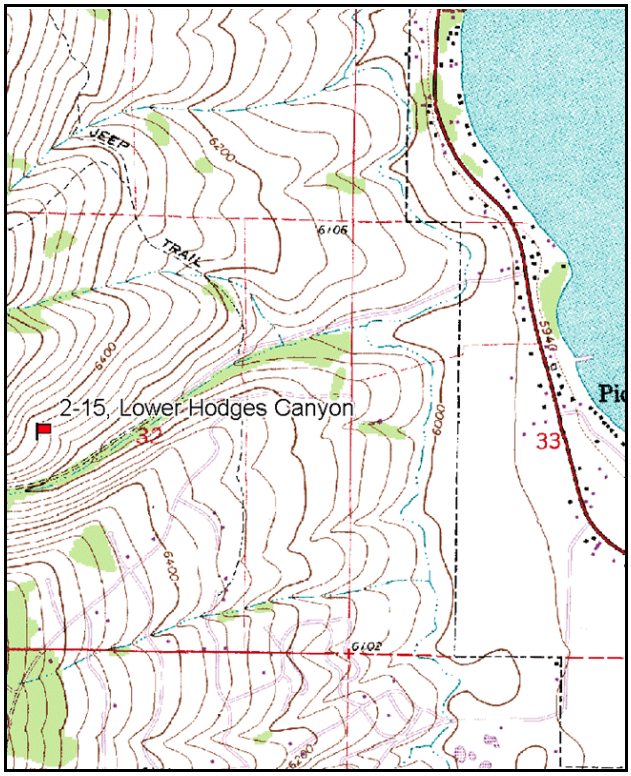
Study site name: Lower Hodges Canyon . Vegetation type: Mountain Brush .

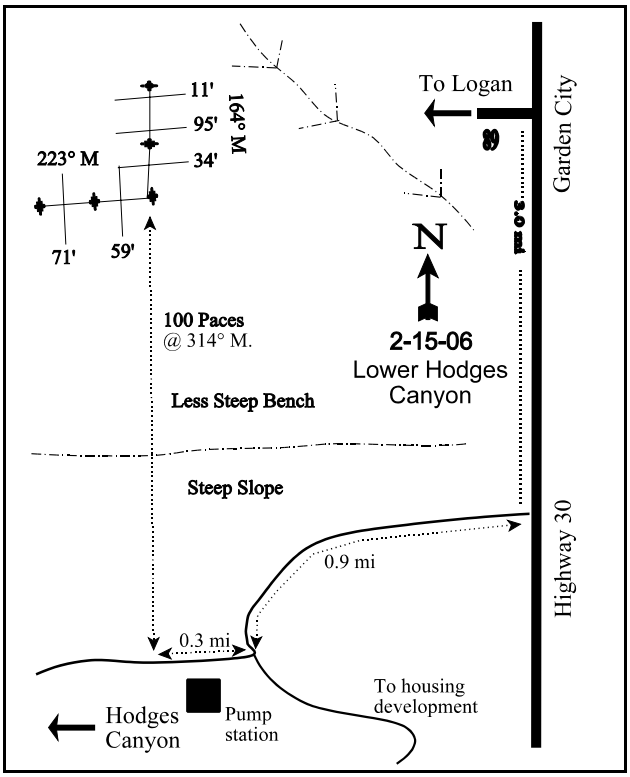
Compass bearing: frequency baseline 164 degrees magnetic.

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

LOCATION DESCRIPTION

From the Garden City junction of U-89 and U-30 proceed south for 3.0 miles and turn right. Travel west for 0.9 miles to a point where the main road curves sharply to the left. Continue straight up Hodges Canyon from this point for 0.3 miles to a small concrete pump station on the left. At the pump station take a bearing of 314 degrees magnetic and walk up the steep slope for approximately 100 paces to the 200-foot stake of the baseline. Walk two hundred feet beyond at 344 degrees magnetic to the 0-foot stake of the baseline, marked by browse-tag #7980. The bearing of the baseline is 164 degrees magnetic. The baseline doglegs at the 200-foot baseline stake and runs 223 degrees magnetic.





Map Name: Garden City Diagrammatic Sketch

Township 14N , Range 5E , Section 32 UTM NAD 27, UTM 12T 4639974 N, 465649 E

DISCUSSION

Lower Hodges Canyon - Trend Study No. 2-15

Study Information

This study is located on private land in Hodges Canyon, just west of Bear Lake in Rich county (elevation: 6,350 feet, slope: 30-35%, aspect: south). The vegetation community is a mountain big sagebrush-grass type, which also contains a number of other shrubs. Pellet group quadrat frequencies in 1996 estimated 19% deer and 3% elk. A pellet group transect read in 2001 estimated 91 deer and 6 elk days use/acre (225 ddu/ha and 15 edu/ha). Pellet group data from 2006 was estimated at 63 deer, 15 elk, and 2 moose days use/acre (155 ddu/ha, 38 edu/ha, and 5 mdu/ha).

Soil

The Rich county soil survey classifies the soil within the Yeates Hollow series. All of the soils in this mapping unit are deep, well-drained, and derived from sedimentary rock. Although not highly permeable to water, the Yeates Hollow soil has good water holding qualities and only a moderate erosion hazard (Campbell and Lacey 1982). Soils are rocky throughout the profile. Due to the rocky nature of the soil, effective rooting depth was estimated at only about 12 inches in 1996. However, deeper rooted shrubs are numerous, indicating no rooting depth restrictions. The soil reaction is slightly acidic (pH of 6.5). Texture is a sandy clay loam. The soil surface is adequately protected from erosion due to abundant and well dispersed vegetation and litter cover. The erosion condition class was determined to be stable in 2001 and 2006.

Browse

The key browse species include mountain big sagebrush and antelope bitterbrush with a small population of serviceberry. Mountain big sagebrush maintained a stable density of about 1,200 plants/acre between 1984 and 1996. The sagebrush density began declining in 2001 and has continued to decrease to only 520 plants/acre in 2006. The percentage of the population classified as dying has steadily increased since 1990 at 7% to 42% in 2006. The population has had a high decadence rate since the establishment of the study in 1984. Decadence has ranged from a low of 47% in 1990 to a high of 68% in 1984. Cover also decreased from 8.5% in 2001 to only 2% in 2006. Utilization was moderate to heavy in 1984 and has been light to moderate since 1990. Reproduction is minimal and no seedlings have been encountered during any reading. A few young plants were sampled in 1990, 1996, and 2006, but sagebrush is not producing enough plants to replace those that are dying. Annual leader growth roughly averaged 1.3 inches in 2001 and 2006.

Bitterbrush has averaged 11% cover since 1996 and density has averaged about 1,400 plants/acre since 1990. The population is moderately to heavily utilized, but has maintained good vigor and low decadence. The age class distribution is mostly mature, but reproduction appears adequate to maintain the population. Leader growth was quite low in 2001, averaging only 1.5 inches, but was higher at 4.2 inches in 2006.

Shrubs of secondary importance include serviceberry and snowberry. Serviceberry has averaged just over 1% cover since 1996 and density has slightly declined from 1990 to 2006 (533 plants/acre in 1990 to 380 plants/acre in 2006). The average mature shrub measures 2.5 feet high with a crown diameter of nearly 4 feet. Utilization has been moderate since 1996. There are no decadent plants but two-thirds of the population displayed poor vigor in 1996 due to a rust infestation. Snowberry has averaged over 10% cover since 2001 with a density of 1,200 plants/acre. Utilization has been mostly light.

Herbaceous Understory

A diverse mixture of grass species provides the bulk of the understory production and cover. Six perennial grasses have been found on the study, but only bluebunch wheatgrass and Sandberg bluegrass are abundant. Annual grasses were reported to occur infrequently in 1984. By 1996, cheatgrass was abundant and provided 16% cover. Nested frequency of cheatgrass declined significantly in 2001 and 2006, reducing cover from 6% to 3%, respectively. Cheatgrass is still widely distributed across the site as quadrat frequency was still at 63%

in 2006. Perennial forb cover has risen from 3% in 1996 to over 9% in 2006. Common perennial species include: tapertip hawksbeard, low penstemon, and yellow salsify. Tapertip hawksbeard had nearly 5% cover in 2006.

1990 TREND ASSESSMENT

Mountain big sagebrush density has decreased slightly from 1,266 plants/acre in 1984 to 1,132 plants/acre in 1990. The population still displays poor vigor on about one-third of the plants sampled. Decadence has declined from 68% to 47%, but this is still relatively high for sagebrush. Utilization is lighter on sagebrush but heavier on bitterbrush. Bitterbrush density increased from 333 plants/acre in 1984 to 1,133 in 1990. Serviceberry was not sampled in 1984, but the population was estimated at 533 plants/acre in 1990. Browse trend is slightly up. Trend for grasses is up. Perennial grass sum of nested frequency increased by 71%. Both bluebunch wheatgrass and Sandberg bluegrass increased significantly in nested frequency. Trend for forbs is up. Perennial forb sum of nested frequency nearly tripled. Species that significantly increased include: penstemon, longleaf pholx, tapertip hawksbeard, and bastard toadflax.

browse - slightly up (+1) grasses - up (+2) forbs - up (+2)

1996 TREND ASSESSMENT

The browse trend appears slightly down for sagebrush but stable for bitterbrush. The sagebrush population is mostly decadent with one-third of the population in poor vigor. Reproduction is limited. Utilization has not been extremely heavy so the high proportion of decadent sagebrush is likely a result of drought. The bitterbrush population is becoming increasingly mature. Utilization is moderate and vigor good. Overall, the browse trend is considered stable. Trend for grasses is slightly down. Bluebunch wheatgrass and Sandberg bluegrass nested frequencies remained similar to 1990, but there was a significant decrease in Kentucky bluegrass. Trend for forbs is down. Perennial forb sum of nested frequency decreased by 44%. Species that significantly decreased include: penstemon, longleaf phlox, and tapertip hawksbeard. The Desirable Components Index rated this study as fair-good due to excellent browse and perennial grass cover, but high annual grass cover prevented it from being better.

winter range condition (DC Index) - fair-good (68) Mid-level potential scale
browse - stable (0) grasses - slightly down (-1) forbs - down (-2)

2001 TREND ASSESSMENT

Trend for the key browse species, mountain big sagebrush and bitterbrush, is slightly down. The sagebrush population appears to be in a state of decline. Population density has declined 28%. Use is mostly light but decadence has increased from 53% in 1996 to 60% in 2001. In addition, 33% of population was classified as dying. Reproduction is poor with no seedlings or young encountered. This trend appears to be driven more by climate and interspecific competition than heavy use by wildlife. Use was moderate to heavy in 1984, but has been light to moderate since. Bitterbrush displays a slightly down trend. Density decreased slightly, but percent cover has remained at 11%. Utilization has been moderate to heavy since 1990, but vigor has remained normal and percent decadence is low. Recruitment, in the form of young plants, has been more than adequate to maintain the population. Trend for grasses is up due to a substantial increase in the sum of nested frequency of perennial grasses combined with a significant decline in cheatgrass. The dominant perennial grasses are bluebunch wheatgrass and Sandberg bluegrass. Trend for forbs is up. Sum of nested frequency of perennial forbs increased by 44%, although they are still a minor component of the herbaceous understory. Tapertip hawksbeard and longleaf pholx were the two main species that increased significantly. The Desirable Components Index rated this study as good due to excellent browse and perennial grass cover with decreasing annual grass cover.

winter range condition (DC Index) - good (75) Mid-level potential scale
browse - slightly down (-1) grasses - up (+2) forbs - up (+2)

2006 TREND ASSESSMENT

Trend for key browse, mountain big sagebrush and bitterbrush, is slightly down. Bitterbrush density has remained similar to the previous reading, but mountain big sagebrush has declined each reading since 1996. Sagebrush density has dropped from 840 plants/acre in 2001 to 520 in 2006 and cover decreased from 9% to 2%. Over half the population is decadent and 42% are classified as dying. Without young recruitment, the sagebrush population may disappear from this area. Trend for grasses is stable. Perennial grass sum of nested frequency has changed very little. Cheatgrass nested frequency significantly declined again and cover averaged 3% in 2006, but cheatgrass is widely distributed across the area. Trend for forbs is up. Sum of nested frequency for perennial forbs increased by 20%. Species that significantly increased include: longleaf phlox and false dandelion. Annual forbs have been increasing with each reading since 1996, when they were first included in the sample. The Desirable Components Index rated this study as good-excellent due to abundant perennial grass and forb cover with decreasing annual grass cover. The sagebrush cover is decreasing and the bitterbrush population is increasing with moderate young recruitment.

winter range condition (DC Index) - good-excellent (78) Mid-level potential scale
browse - slightly down (-1) grasses - stable (0) forbs - up (+2)

HERBACEOUS TRENDS --
Management unit 02 , Study no: 15

Type	Species	Nested Frequency					Average Cover %		
		'84	'90	'96	'01	'06	'96	'01	'06
G	Agropyron spicatum	a139	b196	b209	b210	b226	12.21	11.26	16.93
G	Bromus japonicus (a)	-	-	-	-	4	-	-	.00
G	Bromus tectorum (a)	-	-	c330	b207	a159	16.36	5.45	3.32
G	Koeleria cristata	ab16	a11	ab21	ab19	b37	.63	.43	1.10
G	Poa fendleriana	b19	ab11	a4	ab6	ab8	.06	.18	.27
G	Poa pratensis	bc64	c89	a6	a14	ab41	.12	.48	.64
G	Poa secunda	a10	b119	b118	d201	c163	3.69	6.65	5.01
G	Sitanion hystrix	-	-	-	2	-	-	.03	-
Total for Annual Grasses		0	0	330	207	163	16.36	5.45	3.33
Total for Perennial Grasses		248	426	358	452	475	16.72	19.04	23.96
Total for Grasses		248	426	688	659	638	33.09	24.49	27.30
F	Achillea millefolium	7	4	6	7	1	.19	.07	.03
F	Agoseris glauca	a-	a8	a4	a20	b46	.01	.44	.29
F	Alyssum alyssoides (a)	-	-	148	169	132	1.20	.87	.48
F	Arabis sp.	a-	b11	a-	a-	ab2	-	-	.00
F	Artemisia ludoviciana	-	-	2	-	-	.15	-	-
F	Astragalus beckwithii	a-	a-	a3	ab5	b11	.03	.03	.18
F	Astragalus convallarius	b18	ab6	b8	a-	b13	.02	-	.36
F	Balsamorhiza sagittata	ab6	ab4	b8	a-	a-	.59	.30	.45
F	Camelina microcarpa (a)	-	-	3	3	5	.00	.00	.01
F	Calochortus nuttallii	-	3	3	2	4	.00	.00	.01

Type	Species	Nested Frequency					Average Cover %		
		'84	'90	'96	'01	'06	'96	'01	'06
F	Chaenactis douglasii	-	1	-	-	-	-	-	-
F	Cirsium undulatum	4	11	4	9	2	.06	.25	.33
F	Collomia linearis (a)	-	-	$_{a}$1	$_{a}$-	$_{b}$33	.00	-	.09
F	Comandra pallida	$_{a}$22	$_{b}$40	$_{ab}$27	$_{ab}$24	$_{a}$10	.22	.28	.08
F	Collinsia parviflora (a)	-	-	$_{a}$18	$_{b}$62	$_{b}$61	.06	.13	.39
F	Cordylanthus ramosus (a)	-	-	2	-	3	.03	-	.03
F	Crepis acuminata	$_{a}$10	$_{c}$90	$_{b}$49	$_{c}$99	$_{c}$124	.72	2.98	4.95
F	Cymopterus sp.	-	-	-	4	9	-	.00	.01
F	Descurainia pinnata (a)	-	-	$_{a}$-	$_{a}$1	$_{b}$14	-	.01	.08
F	Draba sp. (a)	-	-	-	2	2	-	.00	.00
F	Epilobium brachycarpum (a)	-	-	$_{b}$14	$_{a}$-	$_{b}$9	.04	-	.02
F	Erigeron sp.	-	-	6	10	8	.18	.18	.53
F	Eriogonum umbellatum	6	3	-	1	1	-	.03	.03
F	Hackelia patens	-	-	9	4	1	.09	.04	.01
F	Holosteum umbellatum (a)	-	-	$_{a}$-	$_{a}$1	$_{b}$63	-	.00	.38
F	Lactuca serriola	-	-	2	4	1	.01	.03	.03
F	Linum lewisii	-	2	3	-	3	.03	-	.03
F	Lomatium sp.	-	-	-	3	4	-	.03	.06
F	Lupinus argenteus	3	-	-	-	-	-	-	.00
F	Microsteris gracilis (a)	-	-	$_{a}$-	$_{b}$27	$_{b}$20	-	.05	.07
F	Penstemon humilis	$_{a}$33	$_{b}$70	$_{a}$21	$_{a}$17	$_{a}$13	.41	.25	.75
F	Phlox longifolia	$_{a}$3	$_{c}$122	$_{a}$22	$_{b}$64	$_{c}$114	.08	.52	1.02
F	Senecio integerrimus	-	-	-	1	-	-	.03	-
F	Sisymbrium altissimum (a)	-	-	-	-	-	-	-	.03
F	Tragopogon dubius	$_{ab}$28	$_{a}$14	$_{b}$43	$_{b}$43	$_{a}$12	.49	.49	.26
F	Unknown forb-perennial	3	2	-	-	-	-	-	-
Total for Annual Forbs		0	0	186	265	342	1.33	1.07	1.61
Total for Perennial Forbs		143	391	220	317	379	3.34	5.99	9.45
Total for Forbs		143	391	406	582	721	4.68	7.07	11.06

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

BROWSE TRENDS --
Management unit 02 , Study no: 15

Type	Species	Strip Frequency			Average Cover %		
		'96	'01	'06	'96	'01	'06
B	Amelanchier alnifolia	16	15	16	1.43	1.27	1.16
B	Artemisia tridentata vaseyana	44	36	23	7.25	8.51	2.26
B	Chrysothamnus viscidiflorus viscidiflorus	13	13	16	.65	1.37	1.17
B	Eriogonum heracleoides	6	7	3	1.41	.33	.15
B	Eriogonum microthecum	21	21	22	.78	1.57	1.75
B	Pediocactus simpsonii	0	1	0	-	-	-
B	Purshia tridentata	55	55	55	11.32	11.55	11.10
B	Symphoricarpos oreophilus	49	48	44	6.24	10.67	10.26
B	Tetradymia canescens	2	3	3	.03	.03	.15
Total for Browse		206	199	182	29.13	35.32	28.03

CANOPY COVER, LINE INTERCEPT --
Management unit 02 , Study no: 15

Species	Percent Cover '06
Amelanchier alnifolia	2.95
Artemisia tridentata vaseyana	2.01
Chrysothamnus viscidiflorus viscidiflorus	1.70
Eriogonum heracleoides	.15
Eriogonum microthecum	3.90
Purshia tridentata	17.25
Symphoricarpos oreophilus	16.36
Tetradymia canescens	.05

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 02 , Study no: 15

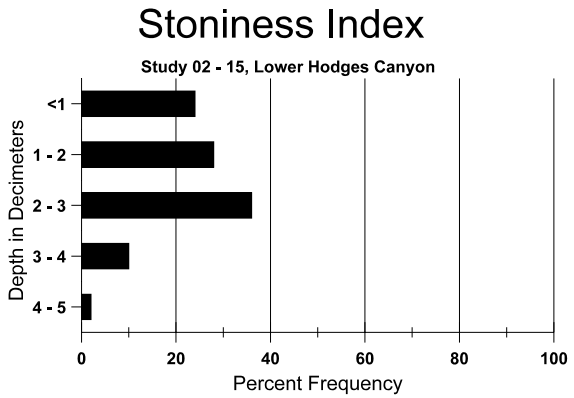
Species	Average leader growth (in)	
	'01	'06
Amelanchier alnifolia	3.4	4.22
Artemisia tridentata vaseyana	1.3	1.2
Purshia tridentata	1.5	4.0

BASIC COVER --
Management unit 02 , Study no: 15

Cover Type	Average Cover %				
	'84	'90	'96	'01	'06
Vegetation	1.00	12.25	66.81	60.50	63.74
Rock	2.25	3.75	1.15	1.22	1.01
Pavement	1.25	1.75	.69	1.45	.44
Litter	86.75	72.75	77.68	58.52	53.47
Cryptogams	.25	.50	.49	1.03	2.24
Bare Ground	8.50	9.00	1.20	2.56	2.19

SOIL ANALYSIS DATA --
Herd Unit 02, Study no: 15, Lower Hodges Canyon

Effective rooting depth (in)	Temp °F (depth)	PH	Sandy clay loam			%0M	PPM P	PPM K	dS/m
			%sand	%silt	%clay				
11.7	53.8 (12.0)	6.5	49.3	25.7	25.0	2.7	23.1	198.4	0.4



PELLET GROUP DATA --
Management unit 02 , Study no: 15

Type	Quadrat Frequency		
	'96	'01	'06
Rabbit	1	2	-
Elk	3	9	4
Deer	19	34	24
Moose	-	-	-

Days use per acre (ha)	
'01	'06
-	-
6 (15)	15 (38)
91 (225)	63 (155
-	2 (5)

BROWSE CHARACTERISTICS --
Management unit 02 , Study no: 15

		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	**533**	-	333	200	-	-	13	0	-	-	0	37/33
96	**460**	20	200	260	-	40	57	13	-	-	74	26/46
01	**340**	-	80	260	-	20	59	6	-	-	0	30/43
06	**380**	-	120	260	-	20	32	5	-	-	0	32/47
Artemisia tridentata vaseyana												
84	**1266**	-	-	400	866	-	63	32	68	-	32	34/46
90	**1132**	-	133	466	533	-	29	0	47	7	29	36/53
96	**1160**	-	40	500	620	940	36	10	53	22	33	30/39
01	**840**	-	-	340	500	780	19	7	60	33	33	30/45
06	**520**	-	40	180	300	820	31	0	58	42	50	34/51
Chrysothamnus viscidiflorus viscidiflorus												
84	**133**	-	-	133	-	-	0	0	0	-	0	19/30
90	**133**	-	-	133	-	-	0	0	0	-	0	28/33
96	**340**	-	-	320	20	-	0	0	6	-	0	20/32
01	**280**	-	-	220	60	-	0	0	21	7	7	18/31
06	**400**	-	20	320	60	60	0	0	15	5	10	19/33
Eriogonum heracleoides												
84	**0**	-	-	-	-	-	0	0	-	-	0	-/-
90	**0**	-	-	-	-	-	0	0	-	-	0	-/-
96	**220**	-	-	220	-	-	0	0	-	-	0	9/15
01	**200**	-	-	200	-	-	20	0	-	-	0	7/16
06	**100**	-	20	80	-	-	0	0	-	-	0	9/13
Eriogonum microthecum												
84	**0**	-	-	-	-	-	0	0	0	-	0	-/-
90	**0**	-	-	-	-	-	0	0	0	-	0	-/-
96	**680**	-	-	680	-	-	0	0	0	-	0	14/22
01	**560**	-	-	560	-	-	0	0	0	-	0	13/19
06	**600**	-	20	540	40	-	0	0	7	-	0	15/22

		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)
Pediocactus simpsonii												
84	**0**	-	-	-	-	-	0	0	-	-	0	-/-
90	**0**	-	-	-	-	-	0	0	-	-	0	-/-
96	**0**	-	-	-	-	-	0	0	-	-	0	-/-
01	**20**	-	-	20	-	-	0	100	-	-	0	-/-
06	**0**	-	-	-	-	-	0	0	-	-	0	-/-
Purshia tridentata												
84	**333**	-	133	200	-	-	0	0	0	-	0	15/27
90	**1133**	-	133	600	400	-	41	18	35	-	6	18/32
96	**1580**	20	80	1460	40	100	52	11	3	1	1	22/41
01	**1320**	-	60	1140	120	40	50	36	9	-	2	22/52
06	**1420**	-	200	1160	60	100	38	17	4	1	1	23/52
Symphoricarpos oreophilus												
84	**1133**	-	533	600	-	-	0	0	0	-	0	29/44
90	**4999**	-	600	4133	266	-	20	0	5	-	5	25/35
96	**1660**	140	180	1480	-	60	5	0	0	-	8	24/41
01	**1260**	-	-	1060	200	-	0	0	16	2	19	26/46
06	**1220**	-	180	780	260	20	0	0	21	8	41	28/48
Tetradymia canescens												
84	**0**	-	-	-	-	-	0	0	0	-	0	-/-
90	**0**	-	-	-	-	-	0	0	0	-	0	-/-
96	**60**	-	-	60	-	-	0	0	0	-	0	19/30
01	**60**	-	-	40	20	-	0	0	33	-	0	16/22
06	**80**	-	20	60	-	-	0	0	0	-	0	18/20