

**MONITORING MULFORD'S MILKVETCH (*ASTRAGALUS MULFORDIAE*)
IN THE BOISE FOOTHILLS: 2000 RESULTS**

By

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ABSTRACT

Mulford's milkvetch (*Astragalus mulfordiae*) is a rare plant endemic to the western Snake River Plain in southwestern Idaho and adjacent eastern Oregon. It is a high priority conservation concern in both states and has been considered for federal listing under the Endangered Species Act in the past. The Boise Foothills represent one of the main population centers for this species. The foothills have the most chronic as well as the most acute habitat loss and degradation problems anywhere within Mulford's milkvetch's range. Although the majority of foothills occurrences are found on private land, eight are located at least partly on city, county, or federal land. It has been recognized for some time that monitoring information was needed to help city and county land managers be proactive in their conservation actions regarding rare plants in the foothills, especially as recreation and other pressures on reserves and other open space areas continues to grow. In 1999, monitoring transects were established by the Idaho Conservation Data Center at Camel's Back Reserve and at the other foothills occurrences located on city, county, and federal lands in 2000.

The goal of the monitoring program is to provide trend information concerning the long-term conservation of Mulford's milkvetch and its habitat. This information will hopefully aid city, county, and federal resource managers in their stewardship of lands supporting this rare species. The monitoring protocol focuses on collecting Mulford's milkvetch census and plant community (habitat) information. This report summarizes the baseline data collected in 2000.

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INTRODUCTION

Mulford's milkvetch (*Astragalus mulfordiae*) is endemic to the western Snake River Plain in southwestern Idaho and adjacent eastern Oregon. Several populations have been extirpated in recent years and others reduced in size and/or quality, especially in the Boise Foothills portion of its range (Moseley 1989; U.S. Fish and Wildlife Service 1995). Extant populations are relatively few in number, tend to be localized in extent, and often have less than a few hundred plants. Rangewide, habitat destruction from urbanization, and habitat degradation, especially weed invasion, have been the species' main threats for many years. Mulford's milkvetch habitat is vulnerable to invasion by weeds. Disturbances associated with wildfires, motorized and non-motorized recreation, sand quarrying, and livestock grazing all contribute to habitat degradation and weed problems in the foothills. Ongoing habitat loss and degradation problems have made Mulford's milkvetch a high priority conservation concern in both Idaho and Oregon.

The Boise Foothills represent one of the main population centers for Mulford's milkvetch and this area has the most chronic as well as the most acute habitat loss and degradation problems anywhere within the species' range. The majority of foothills occurrences are located on private land. However, eight occurrences are located at least partly on city, county, or federal land. Six of these are in reserves managed by the Boise Parks and Recreation Department, one is largely within the Ada County Sanitary Landfill, and part of another is on Bureau of Land Management (BLM) land.

It has been recognized for some time that monitoring information was needed to help city and county land managers be proactive in their conservation actions regarding rare plants in the foothills. For example, one of the management objectives for some of the city reserves is the maintenance of rare plant populations and their habitat (Boise Parks and Recreation Department 1996). The need for conservation information has grown as recreation and other pressures on reserves and other open space areas also has grown. In 1999, monitoring transects were established at Camel's Back Reserve by the Idaho Conservation Data Center (CDC) with funding from the Ada County Planning Department (Mancuso 1999). This initial set of monitoring transects were a first step towards the goal of a more comprehensive foothills monitoring program for Mulford's milkvetch. Progress towards this goal was made in the spring of 2000, when permanently marked monitoring transects were established at the other Boise Foothills occurrences located on non-private lands. Funds provided by the U.S. Fish and Wildlife Service were used to establish these additional transects.

The goal of the monitoring program is to provide trend information concerning the long-term conservation of Mulford's milkvetch and its habitat. This information will hopefully aid city, county, and federal resource managers in their stewardship of lands supporting this rare species. The monitoring protocol focuses on collecting Mulford's milkvetch census and plant community (habitat) information. This report summarizes the baseline data collected in 2000. It also compares the two-year dataset for the transects at Camel's Back Reserve.

METHODS

The monitoring program is based largely on methods used in 1999 when I established monitoring transects for Mulford's milkvetch at Camel's Back Reserve (Mancuso 1999). In 2000, I established permanent monitoring stations at seven additional occurrences. Most occurrences tend to have a mix of widely scattered individual Mulford's milkvetch plants and

interspersed denser plant groupings. To help ensure adequate sampling, the monitoring transects were subjectively located in areas containing a relatively high abundance of Mulford's milkvetch plants. Several occurrences have more than one transect, resulting in a total of 11 transects for the eight occurrences included in the monitoring program. No transects was established at one occurrence (Military Reserve, Cemetery Ridge - East) containing only a handful of scattered Mulford's milkvetch plants. Instead, all the plants within this small occurrence were counted and the rest of the monitoring protocol completed.

The location of each transect has been mapped (Appendix 1). UTM coordinates were obtained at each transect marker stake using a navigation grade (Garmin 12XL) GPS unit. A "Transect Location Form" was also completed in the field for each transect. It provides directions and a sketch map showing landmarks and other details to help relocate transects in the future (Appendix 2). The CDC's Element Occurrence number (a three-digit identifier code for each occurrence in the CDC database) was used to label and identify each transect.

A census of Mulford's milkvetch, along with weed composition and abundance, and soil disturbance information was collected at each transect. Plant community information was also collected at each transect area. Trail width or other disturbance measurements were made at a few selected transects. The monitoring protocol also stipulates that a series of photographs be taken at each transect. Except for the Camel's Back Reserve occurrence which was originally sampled in 1999, the data collected in 2000 represents the baseline to measure future monitoring results against.

Monitoring protocol

Monitoring plots are comprised of a single 25 m belt transect. Red-painted rebar stakes hammered into the ground permanently mark the beginning of each transect, and also serve as the photo point reference marker (except at two transects at Camel's Back Reserve that use existing wood fenceposts to reference the location of the transects). One meter square quadrats are sampled at each meter mark along the transect tap. Sampling starts at the 0 m and ends at the 24 m marks, for a total of 25 microplots/transect. The quadrat frame is aligned flush against the tape when sampling and data are recorded on special monitoring forms developed for this project. Field forms with the 2000 monitoring data are in Appendix 3. Protocol information specific to the transects at Camel's Back Reserve is outlined in the methods section of a report summarizing last year's results (Mancuso 1999). The "Transect Information" section of this report details transect-specific information, such as which side of the tape is sampled, sampling peculiarities, and location of the associated vegetation plot.

Mulford's milkvetch census monitoring

Census and density information are collected by counting every Mulford's milkvetch plant rooted within the quadrat microplot and assigning each plant to one of three growth stage class categories: (1) Reproductive stage class - all individuals with flowers and/or fruits; (2) Non-reproductive stage class - non-flowering/fruitlet individuals that are obviously not seedlings; (3) Seedlings - tiny germinants, usually less than 2 cm tall. Cotyledons are sometimes present, along with one or occasionally two pair of leaves. Plant information is collected along one or both sides of the transect tape, depending on the transect.

Weed monitoring

Although invasive exotic forbs are the primary target of this monitoring attribute; all non-native weed species rooted within the microplot get recorded. The cover of each weedy species within the microplot is estimated and assigned to one of the following cover classes: 0 = no

weedy forbs; 1 = <1% cover; 2 = 1% - 10% cover; 3 = 11% - 25% cover; 4 = 26% - 50% cover; 5 = >50% cover.

Ground disturbance monitoring

The amount of ground disturbance within each microplot is another attribute estimated along the transects. In this case, the disturbance classes reflect the percentage of ground surface within the microplot that is clearly broken, crushed, or sloughing. Ground disturbance cover class categories are as follows:

0 = none	40 = 35 – 44.9%	80 = 75 – 84.9%
10 = 1 – 14.9%	50 = 45 – 54.9%	90 = 85 – 94.9%
20 = 15 – 24.9%	60 = 55 – 64.9%	98 = 95 - 100%
30 = 25 – 34.9%	70 = 65 – 74.9%	

A special “ground disturbance” monitoring transect was established at Lower Powderhouse Gulch (occurrence #700) to monitor changes in the size of an erosion gully that bisects this occurrence in Military Reserve. It appears cutting of this gully destroyed some Mulford’s milkvetch habitat in the past and presently threatens additional habitat along the small draw bottom. A 100 m long transect was run downslope along the gully rim beginning at the point where the gully intersects the Military Reserve boundary fence. Looking down the gully, photos were taken at the 10 m, 25 m, 50 m, 75 m, and 100 m transect marks. One photo was also taken from the 100 m mark facing back up the gully. In addition, the width of the gully at breath height was measured at each of these distances.

Vegetation monitoring

At each transect, plant community and other ecological data are collected for Mulford’s milkvetch habitat using the methods of Bourgeron et al. (1992). A 1/10th acre circular plot is established that overlaps or is in close proximity to the transect area. Two forms are used to collect the plot information (Appendix 4): (1) Community Survey Form – provides location, environmental features, and general site description information; and (2) Ocular Plant Species Data – this form lists the estimated percent cover for every vascular plant species occurring within the plot. Cover classes are as follows:

1 = <1%	30 = 25 – 34.9%	70 = 65 – 74.9%
3 = 1 – 4.9%	40 = 35 – 44.9%	80 = 75 – 84.9%
10 = 5 – 14.9%	50 = 45 – 54.9%	90 = 85 – 94.9%
20 = 15 – 24.9%	60 = 55 – 64.9%	98 = 95 – 100%

Photo points

Photographs using a wide-angle lens and 35 mm print film are taken for each transect. The transect marker stake serves as the reference point (the photo point) from which the photos are taken. Beside the photo point series, one or more additional photos were taken at several transects to show the marker stake, the vegetation plot, or some other landscape feature. Initially, I took four photographs for each photo point. The transect azimuth was one photograph, with the other three taken at 90^o, 180^o, and 270^o from the transect azimuth. Part way through the monitoring program I decided to adjust the photo point protocol. I made the change so the photo point series would produce a full, instead of partial, panoramic view of the transect area. To do this, photos were taken every 45^o between 0^o and 270^o. This resulted in a total of nine photographs for each photo point – the transect azimuth, then 0^o, 45^o, 90^o, 135^o, 180^o, 225^o, 270^o, and 315^o. Because of this change in procedure, some transects have four and others nine photos for year 2000. This inconsistency will be eliminated in the future.

RESULTS

Mulford's milkvetch census monitoring

A total of 345 Mulford's milkvetch plants were tallied at the 11 transects in 2000. Of these, 157 (46%) were reproductive, 32 (9%) were non-reproductive, and 156 (45%) were seedlings. Reproductive plants were the most common stage class at six (55%) transect, while seedlings dominated the other five (45%) transects. No transects were dominated by the non-reproductive stage class. The number of plants/transect varied from a low of 6, to a high of 80. Tallies for each transect are given in Table 1.

The three transects at Camel's Back Reserve now have two years of census data. All of these transects had more plants in 2000 compared to 1999. The increase was mostly due to the large increase in the tally of seedling plants. In contrast, the number of reproductive plants was only slightly higher for each transect, while non-reproductive plant numbers were lower than in 1999. Based on the life history of Mulford's milkvetch, and variations in annual precipitation patterns and other factors affecting germination, the seedling stage should probably be expected to have the most annual variation of the three stage class. The two-year census dataset for Camel's Back Reserve is summarized in Table 2.

Table 1. Mulford's milkvetch census monitoring data for 2000.

Transect	# of plants	Stage class data		
		Reproductive (%)	Non-reproductive (%)	Seedling (%)
700-1	6	6 (100)	0	0
701-1	20	18 (90)	1 (5)	1 (5)
701-2	57	41 (72)	7 (12)	9 (16)
706-1	10	6 (60)	1 (10)	3 (30)
708-1	15	5 (33)	1 (7)	9 (60)
715-1	71	13 (18)	3 (4)	55 (78)
715-2	27	8 (30)	4 (15)	15 (55)
715-3	25	14 (56)	6 (24)	5 (20)
015-1	7	6 (86)	1 (14)	0
018-1	27	7 (26)	4 (15)	16 (59)
018-2	80	33 (41)	4 (5)	43 (54)
Sum	345	157 (46)	32 (9)	156 (45)
Average	28.8	13.1	2.7	13

Table 2. Two years of Mulford's milkvetch census data for Camel's Back Reserve.

Transect	# of plants		Stage class data					
			Reproductive (%)		Non-reproductive (%)		Seedling (%)	
	1999	2000	1999	2000	1999	2000	1999	2000
715-1	39	71	12 (31)	13 (18)	7 (18)	3 (4)	20 (51)	55 (78)
715-2	10	27	6 (60)	8 (30)	1 (10)	4 (15)	3 (30)	15 (55)
715-3	23	25	11 (48)	14 (56)	12 (52)	6 (24)	0	5 (20)

Weed monitoring

Nine different weed species were observed along the transects in 2000. All the transects had three to five weed species, and most microplots at least two species. Individual weed species most commonly occurred in trace amounts (cover class = 1) within a given microplot; however the total weed species cover within a microplot was often higher. Only two microplots (<1% of all microplots) had no weeds. Cheatgrass (*Bromus tectorum*) was the only weed found at every transect. Of the 275 microplots comprising the 11 transects, cheatgrass occurred in 272 (99%) of them. All the other weed species occurred in less than 50% of the microplots. Cheatgrass was the only weed to have over 50% cover (cover class = 5) in a microplot. Weed cover class data are detailed in Appendix 5 and summarized in Tables 3 and 4.

Cover class data for individual weed species were not collected at the Camel's Back Reserve transects in 1999. However, total weed coverage was tallied, and is compared to the 2000 data in Table 5. Weeds, most notably cheatgrass, were more common at all three of the Camel's Back Reserve transects in 2000.

Table 3. Cover class tally for weed species at Mulford's milkvetch monitoring transects. N = 275 microplots (25 microplots x 11 transects).

Species	Weed Cover class					# of microplots (%)
	1	2	3	4	5	
Desert alyssum (<i>Alyssum desertorum</i>)	93	3				96 (35)
Cheatgrass (<i>Bromus tectorum</i>)	60	116	37	26	33	272 (99)
Blue bachelor buttons (<i>Centaurea cyanus</i>)	26	1				27 (10)
Rush skeleton weed (<i>Chondrilla juncea</i>)	11	6				17 (6)
Storksbill (<i>Erodium cicutarium</i>)	123	8				131 (48)
Prickly lettuce (<i>Lactuca serriola</i>)	1					1 (<1)
Bulbous bluegrass (<i>Poa bulbosa</i>)	21	20	1			42 (15)
Tumblemustard (<i>Sisymbrium altissimum</i>)	16	2				18 (7)
Yellow salsify (<i>Tragopogon dubius</i>)	7					7 (3)
Totals (%)	358 (59)	156 (26)	38 (6)	26 (4)	33 (5)	

Table 4. Total weed cover class tally for all transect microplots. N = 275 microplots.

Transect	No weeds	Weed cover class				
		1	2	3	4	5
700-1				2	7	16
701-1		2	9	6	8	
701-2		15	10			
706-1					5	20
708-1		3	13	6	3	
715-1		20	5			
715-2	2	8	11	4		
715-3		1	21	3		
015-1		1	12	10	1	1
018-1		3	18	4		
018-2		5	16	4		
Totals (%)	2 (<1)	58 (21)	115 (42)	39 (14)	24 (9)	37 (13)

Table 5. Total weed cover class tally for all transect microplots at Camel's Back Reserve – 1999 and 2000 data. N = 75 microplots.

Transect	Weed cover class											
	No weeds		1		2		3		4		5	
	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000	1999	2000
715-1	21	-	4	20	-	5	-	-	-	-	-	-
715-2	25	2	-	8	-	11	-	4	-	-	-	-
715-3	14	-	10	1	1	21	-	3	-	-	-	-
Total	60	2	14	29	1	37	-	7	-	-	-	-

Ground disturbance monitoring

More than half (57%) of all microplots had some level of ground disturbance in 2000. The loose, sandy soil characterizing Mulford's milkvetch habitat readily leaves evidence of churning, trampling, and other disturbances. Ground disturbances I observed included footprints, animal prints, bicycle treads, and sloughing and divots of undetermined cause. Only one transect had no ground disturbance within any of its associated microplots. Disturbance was highest at two of the Camel's Back Reserve transects. These were the only two transects to have 50% or greater ground disturbance within any of the microplots. The 2000 ground disturbance cover class data are summarized in Table 6.

Labeled photographs for the special "ground disturbance" monitor transect at the Lower Powderhouse Gulch occurrence are on file with the photo point photographs. Breast height width measurements for the gully were:

- 10 m = 3.7 m
- 25 m = 3.3 m
- 50 m = 2.7 m
- 75 m = 7.9 m
- 100 m = 6.7 m

Table 6. Ground disturbance data for Mulford's milkvetch monitoring transects. N = 275 microplots.

Transect	Ground disturbance cover classes										
	0	10	20	30	40	50	60	70	80	90	98
700-1	16	7	2								
701-1	25										
701-2	3	12	10								
706-1	19	6									
708-1	10	14	1								
715-1						1	1		7	12	4
715-2		3	2	3		1	1	2	1	4	8
715-3	15	4	2	4							
015-1	19	5	1								
018-1	2	13	10								
018-2	9	15		1							
Totals	118	79	28	8	0	2	2	2	8	16	12
(%)	(43)	(29)	(10)	(3)		(<1)	(<1)	(<1)	(3)	(6)	(4)

Vegetation monitoring

Vegetation data were collected for each occurrence. For two of the three occurrences with multiple transects, there was only a single vegetation plot. Vegetation at most transect sites was characterized by open shrub cover, usually high graminoid cover dominated by cheatgrass, and a diverse set of forbs, all with low cover. Table 7 summarizes the plot data by transect (common plant names are provided in Appendix 6). It lists cover class values for species in the plots, as well as overall constancy values. The list is comprised of 59 species, including five shrubs, ten grasses, and 44 forbs. Thirteen (22%) are introduced species, including rush skeleton weed (*Chondrilla juncea*), a noxious weed that occurred in all but one plot. Seventeen species (28%) occurred in only one plot, while five (8%) occurred in all of the plots. The number of species/plot ranged from 20 to 29, with an average of 23.

Photo points

All photographs were labeled and placed on file at the CDC office in Boise. Duplicate photos were placed on file at the U.S. Fish and Wildlife Service office in Boise.

Table 7. Year 2000 vegetation plot data for Mulford’s milkvetch monitoring stations. Cover class values are explained in the text.

Species	Transect										Constancy
	700-1	701-1	705-1	706-1	708-1	715-1	715-2	715-3	015-1	018-1	
Shrubs											
Chrysothamnus nauseosus	10	10	3	10	10	3	20	20	20	1	100
Chrysothamnus viscidiflorus				3	1	1	1		3		50
Eriogonum microthecum										1	10
Purshia tridentata	3	3	10	10					1	20	60
Graminoids											
Agropyron spicatum		1	1	1						3	40
Aristida longiseta	3	10	3	1	3		1	1	30		80
Bromus tectorum	80	50	60	80	30	60	40	50	20	10	100
Festuca sp. (annual)		1									10
Oryzopsis hymenoides										1	10
Poa bulbosa	1	3		1		3	1	3		1	70
Poa secunda	1	1	1	1	1	1	1	1	10	3	100
Secale cereale			1	1		3	1	1			50
Sitanion hystrix								1			10
Stipa comata	10	10	3	10		10	20	10			70
Forbs											
Achillea millefolium	1	1	1	1	1	1		1			70
Allium aaseae							1		1		20
Allium acuminatum	1										10
Alyssum desertorum			10		1	1	3			3	50
Ambrosia artemisiifolia		1	1		1	1		1	1		60
Amsinckia retrorsa	1		1	1							30
Amsinckia tessellata						1				1	20
Antennaria dimorpha									1		10
Astragalus mulfordiae	1	1	1	1	1	1	1	1	1	1	100
Astragalus purshii		1						1			20
Balsamorhiza sagittata		1					1	1			30

Species	Transect										Constancy
	700-1	701-1	705-1	706-1	708-1	715-1	715-2	715-3	015-1	018-1	
<i>Brodiaea douglasii</i>		1		1	1	1	1	1			60
<i>Centaurea cyanus</i>	3	1						1			30
<i>Chaenactis douglasii</i>		1	1	1	1						40
<i>Chondrilla juncea</i>	1	3	1	1	3	1	1	3	1		90
<i>Commandra umbellata</i>				1							10
<i>Crepis occidentalis</i>		1									10
<i>Cryptantha circumscissa</i>				1							10
<i>Cryptantha flaccida</i>	1				1			1		1	40
<i>Delphinium andersonii</i>										1	10
<i>Descurainia richardsonii</i>										1	10
<i>Draba verna</i>					1			1			20
<i>Epilobium brachycarpum</i>				1				1		1	30
<i>Eriogonum strictum</i>			1	1					1	1	40
<i>Eriophyllum lanatum</i>			1								10
<i>Erodium cicutarium</i>	3	1	1		1	1	3	3	3	1	90
<i>Galium aparine</i>										1	10
<i>Gilia leptomeria</i>				1	1						20
<i>Grindelia squarrosa</i>		1						1			20
<i>Holosteum umbellatum</i>			1	1	1		1		1		50
<i>Lactuca serriola</i>					1						10
<i>Layia glandulosa</i>				1							10
<i>Lomatium triternatum</i>		1				1	1		1		40
<i>Macaeranthera canescens</i>	1	3	1	1	1	1	1	1	1	1	100
<i>Mentzelia albicaulis</i>										1	10
<i>Oenothera pallida</i>	1				1	3	1				40
<i>Oenothera scapoidea</i>	1				1			1	1		40
<i>Phacelia heterophylla</i>	3	1	1	1	1		1	1		1	80
<i>Phacelia linearis</i>				1					1	1	30
<i>Plantago patagonica</i>		1			1			1	1		40
<i>Polygonum douglasii</i>				1	1	1					30
<i>Salsola iberica</i>				1							10
<i>Sisymbrium altissimum</i>	1	1		1	1	1		1			60
<i>Taraxacum officinale</i>						1					10
<i>Tragopogon dubius</i>		1	1		1				1		40
Bryophyte/Lichen	1	10	3	20	3	1	1	3	20	3?	100

TRANSECT INFORMATION

All compass readings were taken with declination set at 16° .

700 Lower Powderhouse Gulch

Transect 700-1

Transect bearing = 112° . The transect runs parallel to and just below the south crest of a spur ridge. Microplots are read on the uphill side (left-hand side when standing at the marker and facing the 25 m point) of the tape. The marker stake is at a slightly higher elevation than the end point of the transect. The vegetation plot is located on the southerly-facing slope immediately below the transect, with plot center positioned 11.3 m downslope from the 13 m mark along the transect tape. This makes the 13 m mark the top of the plot.

In addition to the Mulford's milkvetch transect, a special "ground disturbance" transect was also established to monitor size changes to the large erosion gully that bisects part of the occurrence. A series of photographs and associated measurements of the width of the gully were made at a series of points along the transect tape.

701 Military Reserve – Veterans Ridge - This occurrence has two transects.

Transect 701-1

Transect bearing = 312° . The transect runs roughly parallel to the slope. Mulford's milkvetch census data were collected from microplots read on both sides of the transect tape. Weed cover class and ground disturbance cover class data were collected only on the left side (when facing uphill at the 0 m starting point) of the tape. The vegetation plot uses the rebar marker stake as plot center.

Transect 701-2

Transect bearing = 323° . The transect is read downhill to uphill on the right side (when facing uphill at the 0 m starting point) of the tape. The transect runs parallel to the slope, more or less along the west (left-hand when facing uphill) edge of a sandy dirt track used by many hikers and bicyclists. The east (right-hand) edge of the tread seems to receive the most use, however. Mulford's milkvetch is established within this chronically disturbed tread zone. Because it is located so close to transect 701-1, I did not collect separate vegetation plot data for transect 701-2.

705 Military Reserve, Cemetery Ridge/East – This is a small occurrence, about 0.1 acre in size, located on a steep, southeast-facing, sandy slope with open bitterbrush and intermixed gray rabbitbrush. It consists of fewer than ten scattered Mulford's milkvetch plants. These conditions are not conducive to a monitoring transect. Instead, I simply walked around and counted all the milkvetch plants in the area. I did permanently mark the occurrence with a rebar stake, which serves as the center point for the vegetation plot and the reference point for taking photographs.

706 Military Reserve, Cemetery Ridge/West

Transect 706-1

Transect bearing = 14° . The transect runs perpendicular to the slope and microplots were read on both sides of the tape. The 13 m mark of the transect tape is plot center for the vegetation plot.

708 Lower Hulls Gulch

Transect 708-1

Transect bearing = 258° . The transect runs more or less perpendicular to the gentle lower slope, with microplots sampled on the uphill side of the transect tape. The vegetation plot is centered at the 15 m mark of the transect tape.

715 Camel's Back Reserve - This occurrence has three transects. Detailed information about the transects is provided in my 1999 report (Mancuso 1999). Some of it is repeated here, along with some updated information.

Transect 715-1 (equals 1999 transect CB-1)

Transect bearing = 197° . The transect runs perpendicular to the slope along the uphill margin of a pedestrian trail. Microplots are sampled on the uphill side of the transect tape. I sampled 27 m for this transect to capture a relatively dense cluster of Mulford's milkvetch plants just beyond the 25 m mark. However, only data from the first 25 m are used in the analysis. The community vegetation plot is located on the west-facing slope centered at the 13 m mark of the transect, so it includes areas both uphill and downhill of the transect.

Transect 715-2 (equals 1999 transect CB-2)

Transect bearing = 186° . The transect runs downhill, parallel to the slope, along the margin of a closed dirt path. Microplots are sampled on alternating sides of the transect tape. Even meter numbers are read on the left-hand side, and odd meter numbers on the right-hand side, facing downhill. To minimize impacts to the very erosive transect area I placed the vegetation plot on the adjacent, steep, southeasterly-facing slope. The split-rail fence passing above the transect forms the uphill edge of the vegetation plot. The transect looked different compared to 1999. It appears that there has been some filling in of the badly eroded dirt path. It now has more of a "U-shape" versus "V-shape" cross-section.

Transect 715-3 (equals 1999 transect CB-3)

Transect bearing = 298° . The transect runs uphill, parallel to the slope along the north (right-hand side when facing uphill) margin of an old tread. Microplots are sampled on the left-hand side of the tape facing uphill.

015 Seaman Gulch

Transect 015-1

Transect bearing = 336° . The transect runs along and perpendicular to the upper slope, just below the ridgecrest. The microplots are sampled on the downhill side of the tape. The vegetation plot is located on the southwest-facing slope below the transect, with plot center situated 11.3 m downhill from the 13 m mark on the transect tape. With this layout, the middle of the transect forms the top of the vegetation plot.

018 Middle Stewart Gulch – This is a large occurrence, most of which is located on private land. I established two monitoring transects in close proximity to each other on BLM land, in the northeastern corner of the occurrence.

Transect 018-1

Transect bearing = 153° . The transect runs perpendicular to the slope. Mulford's milkvetch is sampled on both the uphill and downhill sides of the tape; however, only the uphill side is read for recording weed cover and ground disturbance data. The transect area is comprised of unconsolidated sand and care must be taken to minimize trampling the milkvetch and its habitat. To avoid further trampling along the transect, the vegetation plot is centered 15 m uphill of the transect tape's 13 m mark.

Transect 018-2

Transect bearing = 161°. The transect runs perpendicular to the slope and is located roughly 50 paces downhill from transect 018-1. There is a cluster of large strict buckwheat (*Eriogonum strictum*) plants located close to the rebar marker stake. There are no fenceposts or other conspicuous reference points to base measurements from and help relocate the transect stake. It will be necessary to use the "Transect Location Form" for transect 018-1 to help relocate transect 018-2. Because of its close proximity and generally similar vegetation to transect 018-1, I did not do a separate vegetation plot for transect 018-2.

RECOMMENDATIONS

I have several recommendations based on experience gained in 2000.

1. I recommend collecting Mulford's milkvetch census data on both sides of the transect tape for all transects. This will boost the number of plants tallied at most transects. It will also eliminate the inconsistency of sampling along one side at some transects, but both sides at others.
2. Although no dead Mulford's milkvetch plants were observed in 2000, they can be expected in the future. I recommend a "dead" stage class be added to the census information collected.
3. To provide a full panoramic view, I recommend taking a set of nine photos at all photopoints. In addition to a photo taken along the transect azimuth, it requires photos be taken at 0°, 45°, 90°, 135°, 180°, 225°, 270°, and 315°.
4. Ideally, transects should be resampled every year. This will provide managers regular and timely conservation information, which in turn can help them make adaptive management decisions on a timely basis if the conservation of certain occurrences calls for it. Commitment by managers to fund the monitoring program and use the results will be an important factor in ensuring the long-term conservation of Mulford's milkvetch in the Boise Foothills.

REFERENCES

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Appendix 1

Map locations of Mulford's milkvetch monitoring transects in the Boise Foothills.

Appendix 2

Mulford's milkvetch monitoring transect location forms.

Appendix 3.

Mulford's milkvetch monitoring transect sheets – 2000 data.

Appendix 4

Community Survey and Ocular Plant Species data sheets – 2000 data.

Appendix 5

Summary of cover class data for weed species at Mulford's milkvetch monitoring transects.

Transect	Species	Weed cover class					
		None	1	2	3	4	5
701	Bromus tectorum	0			2	12	11
	Centaurea cyanus	11	13	1			
	Chondrilla juncea	19	1				
	Erodium cicutarium	2	16	7			
	Sisymbrium altissimum	13	10	2			
	Total	45	40	10	2	12	11
701-1	Bromus tectorum	0	2	11	4	8	
	Centaurea cyanus	21	4				
	Erodium cicutarium	9	16				
	Poa bulbosa	19	3	3			
	Tragopogon dubius	23	2				
	Total	72	27	14	4	8	
701-2	Bromus tectorum	0	21	4			
	Erodium cicutarium	7	18				
	Poa bulbosa	8	9	8			
	Total	15	48	12			
706-1	Bromus tectorum	0				4	21
	Chondrilla juncea	22	3				
	Tragopogon dubius	24	1				
	Total	46	4			4	21
708-1	Bromus tectorum	0	3	13	8	1	
	Centaurea cyanus	24	1				
	Chondrilla juncea	18	4	3			
	Erodium cicutarium	19	6				
	Lactuca serriola	24	1				
	Total	85	15	16	8	1	
715-1	Alyssum desertorum	0	25				
	Bromus tectorum	0	20	5			
	Erodium cicutarium	19	6				
	Total	19	51	5			
715-2	Alyssum desertorum	5	20				
	Bromus tectorum	2	11	8	4		
	Erodium cicutarium	12	13				
	Poa bulbosa	21	2	2			
	Sisymbrium altissimum	19	6				
	Total	59	52	10	4		

Transect	Species	Weed cover class					
		None	1	2	3	4	5
715-3	Alyssum desertorum	24	1				
	Bromus tectorum	0	2	21	2		
	Centaurea cyanus	17	8				
	Chondrilla juncea	19	3	3			
	Erodium cicutarium	5	20				
	Total	65	34	24	2		
015-1	Bromus tectorum	0	2	11	10	1	1
	Erodium cicutarium	10	14	1			
	Tragopogon dubius	21	4				
	Total	31	20	12	10	1	1
018-1	Alyssum desertorum	0	23	2			
	Bromus tectorum	1	6	16	2		
	Erodium cicutarium	22	3				
	Poa bulbosa	23	1	1			
	Total	46	33	19	2		
018-2	Alyssum desertorum		24	1			
	Bromus tectorum		13	12			
	Erodium cicutarium	14	11				
	Poa bulbosa	12	6	6	1		
	Total	26	54	19	1		

Appendix 6

List of common names for plants occurring in plant community plots at Mulford's milkvetch monitoring transects.

Scientific name

Common name

Shrubs

Chrysothamnus nauseosus
Chrysothamnus viscidiflorus
Eriogonum microthecum
Purshia tridentata

gray rabbitbrush
green rabbitbrush
slenderbush buckwheat
antelope bitterbrush

Graminoids

Agropyron spicatum
Aristida longiseta
Bromus tectorum
Festuca sp. (annual)
Oryzopsis hymenoides
Poa bulbosa
Poa secunda
Secale cereale
Sitanion hystrix
Stipa comata

bluebunch wheatgrass
red threeawn
cheatgrass
fescue sp.
Indian ricegrass
bulbous bluegrass
Sandberg's bluegrass
rye
squirreltail
needle-and-thread

Forbs

Achillea millefolium
Allium aaseae
Allium acuminatum
Alyssum desertorum
Ambrosia artemisiifolia
Amsinckia retrorsa
Amsinckia tessellata
Antennaria dimorpha
Astragalus mulfordiae
Astragalus purshii
Balsamorhiza sagittata
Brodiaea douglasii
Centaurea cyanus
Chaenactis douglasii
Chondrilla juncea
Commandra umbellata
Crepis occidentalis
Cryptantha circumscissa
Cryptantha flaccida
Delphinium andersonii
Descurainia richardsonii
Draba verna
Epilobium brachycarpum
Eriogonum strictum

common yarrow
Aase's onion
taper-tip onion
desert alyssum
Roman wormwood
rigid fiddleneck
tesselate fiddleneck
pussy-toes
Mulford's milkvetch
Pursh's milkvetch
arrowleaf balsamroot
Douglas' brodiaea
blue bachelor buttons
false yarrow
rush skeleton weed
bastard toad-flax
western hawksbeard
matted cryptantha
weak-stemmed cryptantha
Anderson's larkspur
mountain tansy mustard
spring whitlow-grass
tall annual willow-herb
strict buckwheat

Scientific name

Common name

<i>Eriophyllum lanatum</i>	common eriophyllum
<i>Erodium cicutarium</i>	storksbill
<i>Galium aparine</i>	goose-grass cleavers
<i>Gilia leptomeria</i>	Great Basin gilia
<i>Grindelia squarrosa</i>	curly-gup gumweed
<i>Holosteum umbellatum</i>	holosteum
<i>Lactuca serriola</i>	prickly lettuce
<i>Layia glandulosa</i>	tidytips
<i>Lomatium triternatum</i>	nine-leaf lomatium
<i>Machaeranthera canescens</i>	hoary aster
<i>Mentzelia albicaulis</i>	small-flowered mentzelia
<i>Oenothera pallida</i>	white-stemmed evening-primrose
<i>Oenothera scapoidea</i>	naked-stemmed evening-primrose
<i>Phacelia heterophylla</i>	varileaf phacelia
<i>Phacelia linearis</i>	threadleaf phacelia
<i>Plantago patagonica</i>	Indian-wheat
<i>Polygonum douglasii</i>	Douglas' knotweed
<i>Salsola iberica</i>	tumbleweed
<i>Sisymbrium altissimum</i>	tumblemustard
<i>Taraxacum officinale</i>	common dandelion
<i>Tragopogon dubius</i>	yellow salsify